CHARACTERISTICS OF THE POSTTRAUMATIC STRESS DISORDER TRAUMATIC STRESSOR: A STUDY OF RURAL AND NORTHERN FIRST RESPONDERS

by

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Abstract

A diagnosis of posttraumatic stress disorder (PTSD) requires meeting Criterion A, which states that the individual must: 1) experience, witness, or be confronted with an event that involved actual or threatened death, serious injury, or threat to one’s physical integrity (Criterion A1); and 2) experience intense fear, helplessness, or horror during or shortly after the event (Criterion A2). Despite various attempts to define Criterion A, a strong etiological link between the event and resulting PTSD has remained elusive. The overarching purpose of the current study was to examine characteristics of traumatic stressors beyond Criterion A. A cross-sectional, repeated-measures design was used to examine Criterion A1 events under two conditions: when an event was associated with lasting distress (i.e., distressing event) and when an event was not associated with lasting distress (i.e., control event). This research addressed four objectives. First, it identified characteristics of Criterion A1 events that evoked extreme amounts of distress (i.e., PTSD symptoms). Second, it examined whether these characteristics were more relevant for distressing events compared to control events. Third, it tested whether event characteristics added incremental value in predicting PTSD symptoms above meeting Criterion A. Finally, it tested hypothesized relationships between event characteristics and processes implicated in cognitive models, namely peritraumatic dissociation and posttrauma cognitions.

The present study surveyed 181 first responders from northern British Columbia. First responders repeatedly experience Criterion A1 events, which allowed them to rate the relevance of event characteristics for both types of events. A principal component analysis of diverse event characteristics revealed that distressing events were characterized by chaos and resource limitations, which were both rated as significantly more descriptive of distressing events compared to control events. As hypothesized, both event characteristics predicted PTSD
symptoms above meeting Criterion A, which was not associated with PTSD symptoms.

Consistent with cognitive models, the event characteristics influenced peritraumatic dissociation and posttrauma cognitions, which in turn predicted PTSD symptoms. Moreover, the affect of the event on PTSD symptoms was partially mediated by these cognitive variables. Overall, the results of this study are novel because they underscore the importance of examining event characteristics beyond Criterion A.
Preface

This research presented in this dissertation was part of a project that was conducted by the Workplace Traumatic Stress Team. This team consisted of researchers affiliated with the University of British Columbia (UBC; Dr. Lynn Alden, Dr. William Koch, and myself), University of Northern British Columbia (UNBC; Dr. Shannon Wagner, Dr. Henry Harder, and Dr. Ken Prkachin), Vancouver Island University (Dr. Melanie O’Neill), and agency representatives from the Royal Canadian Mounted Police (Dr. Roland Bowman), Fraser-Fort George Area volunteer firefighters (Ms. Melanie Perrin), and the British Columbia Ambulance Services (Mr. Mike Michalko). I was primarily responsible for proposing the research questions addressed in this study, research design, and supervising the data collection. The team provided feedback and consultation on the measures and procedures included in this study.

No part of the research presented in this document has been published. The study presented in the dissertation was approved by the UBC Behavioural Research Ethics Board (certificate number H08-02978), and the UNBC Research Ethics Board (certificate number E2010.0215.033).
Table of Contents

Abstract ........................................................................................................................................... ii
Preface........................................................................................................................................... iv
Table of Contents ............................................................................................................................ v
List of Tables ................................................................................................................................... viii
List of Figures ................................................................................................................................ ix
Acknowledgments ............................................................................................................................ x

1.  Introduction ................................................................................................................................. 1
   1.1 Posttraumatic Stress Disorder ................................................................................................. 2
       1.1.1 Biological and Neurological Correlates of PTSD ............................................................. 3
       1.1.2 PTSD and the Workplace ................................................................................................. 5
   1.2 The DSM Stressor Criterion ..................................................................................................... 6
       1.2.1 The DSM-III .................................................................................................................... 7
       1.2.2 The DSM-IV .................................................................................................................... 8
       1.2.3 The DSM-V .................................................................................................................... 10
   1.2.4 Summary ............................................................................................................................ 11
   1.3 The Traumatic Stressor ........................................................................................................... 11
       1.3.1 Trauma Categories .......................................................................................................... 12
       1.3.2 Trauma Characteristics .................................................................................................... 12
   1.4 First Responders ...................................................................................................................... 13
       1.4.1 Work-related Traumatic Stressors ..................................................................................... 15
           1.4.1.1 Criterion A Trauma Categories .................................................................................. 15
           1.4.1.2 Other Characteristics ............................................................................................... 17
       1.4.2 Rural First Responders .................................................................................................... 22
   1.5 Cognitive Models of PTSD ..................................................................................................... 23
       1.5.1 Peritraumatic Processing ................................................................................................ 24
       1.5.2 Posttrauma Cognitions .................................................................................................... 25
   1.6 Overall Summary ...................................................................................................................... 28
   1.7 Current Study ........................................................................................................................... 29
       1.7.1 Objective One ................................................................................................................... 29
       1.7.2 Objective Two .................................................................................................................. 30
       1.7.3 Objective Three .............................................................................................................. 30
       1.7.4 Objective Four ................................................................................................................. 31

2.  Methods ........................................................................................................................................ 33
   2.1 Participants ............................................................................................................................... 33
   2.2 Measures ................................................................................................................................ 36
       2.2.1 The Posttraumatic Stress Disorder Diagnostic Scale (PDS) ......................................... 36
       2.2.2 Description of Event Questionnaire (DEQ) .................................................................... 37
       2.2.3 Peritraumatic Dissociation Experiences Questionnaire (PDEQ) ..................................... 38
       2.2.4 Posttraumatic Cognitions Inventory-Abbreviated (PTCI-A) ........................................... 38
       2.2.5 Beck Depression Inventory-II (BDI) ............................................................................... 39
   2.3 Procedure ................................................................................................................................ 39
       2.3.1 Participant Recruitment ................................................................................................... 39
       2.3.2 Questionnaire Administration ......................................................................................... 40

3.  Results ......................................................................................................................................... 41
4.7.1 Peritraumatic Processing Pathway ............................................................................... 86
4.7.2 Posttrauma Cognitions Pathway .................................................................................. 89
4.7.3 Direct Path to PTSD Symptoms .................................................................................. 93
4.8 Implications for Criterion A............................................................................................ 93
4.9 Possible Professional Differences.................................................................................... 96
4.10 Limitations .................................................................................................................... 97
4.11 Strengths and Contributions.......................................................................................... 100
4.12 Applications .................................................................................................................. 102
4.13 Areas for Future Research ............................................................................................ 104
4.14 Conclusions.................................................................................................................... 106
References .......................................................................................................................... 108
List of Tables

Table 1  Participant Characteristics .............................................................................................. 35
Table 2  Frequency of PDS Event Categories for the Distressing Event ........................................ 46
Table 3  Frequency of PDS Event Categories for the Control Event ............................................. 46
Table 4  Mean Scores and Standard Deviations on the PDS Criterion A Questions .................... 47
Table 5  Frequencies of the Location of the Event Types ................................................................. 48
Table 6  Principal Components Analysis Loadings with Varimax Rotation of the DEQ-DIS .... 52
Table 7  Means and Standard Deviations of the DEQ Scales for the Event Types ...................... 55
Table 8  Correlations Between the DEQ-DIS Scales, PTSD Symptoms, and Cognitive Variables ....................................................................................................................................................... 56
Table 9  Means and Standard Deviations of the DEQ-DIS Scales for the Clinical and Non-Clinical Groups ....................................................................................................................................................... 56
Table 10 Correlations Between PTSD Symptoms, Covariates, Criterion A, and DEQ-DIS Scales ....................................................................................................................................................... 59
Table 11 Hierarchical Multiple Regression Predicting PDS-S from Covariates, Criterion A, and DEQ-DIS Scales ....................................................................................................................................................... 61
Table 12 Correlations Between Variables in the Structural Equation Model .............................. 64
Table 13 Sobel Tests of the Mediators for the Event and PTSD Symptom Pathways ................ 66
Table 14 Means and Standard Deviations of DEQ-DIS Items Excluded from the Principal Components Analysis ....................................................................................................................................................... 67
List of Figures

Figure 1  Proposed Test of Variables in Cognitive Models of PTSD................................. 32
Figure 2  Proposed Structural Model of Event Characteristics, Cognitive Variables and PTSD
Symptoms ..................................................................................................................................... 62
Figure 3 Structural Model of Event Characteristics, Cognitive Variables and PTSD Symptoms 65
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1. Introduction

Posttraumatic stress disorder (PTSD) is an anxiety disorder that arises following an emotionally traumatic experience. PTSD is one of the few disorders that require a specific type of etiological event (i.e., the traumatic stressor) as one of the diagnostic criteria. Despite more than three decades of research on the stressor criterion, there continues to be confusion and controversy about the essential qualities that render an event a “trauma”. Accordingly, the central topic addressed by this dissertation was the assessment and conceptualization of a traumatic stressor. My over-arching research goal was to identify characteristics of events that evoke extreme emotional distress, in the form of posttraumatic stress symptoms, compared to similar events that do not. From herein, I will refer to the first type of event as the “distressing event”, and the second type of event as the “control event”. My focus was on the events experienced by first responders (i.e., firefighters, paramedics, and police), who are responsible for dealing with crisis situations as a part of their work. Because of the expected exposure to a wide range of potentially traumatic events, first responders provided a good context in which to study features of a traumatic stressor. Thus, this research also addressed PTSD in a workplace context.

In this introduction, I will first describe PTSD, including a brief review of work-related PTSD. I will then review the history of attempts to define the features of a traumatic stressor within the Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association (APA). Next, I will discuss research on other characteristics of the traumatic stressor. I will then further explore these trauma characteristics with a focus on first responders. Finally, I will discuss cognitive theories of PTSD and how research on the nature of the traumatic stressor can inform such models.
1.1 Posttraumatic Stress Disorder

The professional standard for clinical diagnosis of psychiatric problems is the fourth edition of the DSM (DSM-IV; APA, 1994). The current DSM-IV requires that an individual meet six criteria to qualify for a clinical diagnosis of PTSD. Criterion A is having experienced a traumatic event, which was the focus of this research. The individual must also display three clusters of symptoms. The first cluster (Criterion B) pertains to re-experiencing the traumatic event through flashbacks, intrusive memories, nightmares, or physiological distress. The second cluster (Criterion C) reflects persistent avoidance of reminders of the trauma (e.g., people, conversations, and activities) and emotional numbing (e.g., being unable to feel positive emotions). The third cluster (Criterion D) comprises symptoms of hyperarousal and includes irritability, insomnia, concentration difficulties, hypervigilance, and an exaggerated startle response. PTSD symptoms must persist for at least 1 month (Criterion E) and significantly impair the individual’s day-to-day functioning or cause significant distress (Criterion F). While the DSM-IV uses a dichotomous diagnosis that distinguishes people who meet these criteria from those who do not, in fact, traumatic stress symptoms fall along a dimension of severity, with many people displaying some PTSD symptoms without meeting full diagnostic criteria for PTSD. Accordingly, researchers often use PTSD symptom severity scores (i.e., the summed presence or severity of criteria B, C and D) as the measure of traumatic stress symptoms. In this research, I followed this convention and used “PTSD symptoms” to reflect the dimensional nature of PTSD.

The prevalence of PTSD in the general population is estimated to be 8% (APA, 1994), although the exact rate varies depending on assessment format (i.e., questionnaire versus interview). A meta-analysis by Brewin, Andrews, and Valentine (2000), found that PTSD was
diagnosed more frequently in women, individuals with limited education, and younger rather than older individuals. However, the effect sizes of these demographics was of a small magnitude, lower than that of other peritraumatic variables (e.g., dissociation and emotional responses) and posttrauma individual differences (e.g., perceived social support), both of which had a moderate effect size in another meta-analysis (Ozer, Best, Lipsey, & Weiss, 2003). PTSD often has a chronic course with approximately 90% of individuals who meet DSM-IV criteria continuing to meet diagnosis at 3 months posttrauma (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The median duration of PTSD symptoms is approximately two years (Breslau et al., 1998).

Depression is commonly associated with PTSD symptoms. In a cross-sectional study, depression had substantial comorbidity (40.5%) with PTSD after a traumatic event (Tural, Önder, & Aker, 2012). Similarly, in longitudinal research Shalev et al. (1998) found that the comorbidity between major depression and PTSD remained stable across time, affecting 28 (44.4%) of 63 individuals with PTSD at 1 month posttrauma, and 16 (43.2%) of 37 individuals with PTSD 4 months posttrauma. Comorbid depression is also associated with poorer outcomes. Blanchard, Buckley, Hickling, and Taylor (1998) found that motor vehicle accident victims who were experiencing both PTSD and a major depressive episode were functioning worse than those with PTSD alone. Moreover, these individuals had a lower rate of spontaneous remission at 6 months follow-up.

1.1.1 Biological and Neurological Correlates of PTSD

A growing body of research has identified psychophysiological, biological and neurological correlates of PTSD (for a review, see Pitman et al., 2012). Psychophysiological studies have generally focused on the heightened arousal associated with PTSD. In a recent
meta-analysis, individuals with PTSD were found to have a higher resting heart rate, a larger heart rate response to startling sounds, and a larger increase in heart rate when exposed to trauma cues (Pole, 2007). This arousal is often considered part of an ongoing biological stress response, which is partially driven by the hypothalamus-pituitary-adrenal cortical (HPA) axis. Research suggests that PTSD is typically accompanied by decreased plasma cortisol, combined with increased cortisol releasing factor in the cerebrospinal fluid (de Kloet et al., 2006).

Neuroimaging studies have generally been guided by the role of memory and emotion in the development and expression of PTSD symptoms (see Hayes Elzakker, & Shin, 2012), leading to a focus on the hippocampus and amygdala. A recent meta-analysis of MRI studies found that individuals with PTSD had a lower hippocampal volume than both trauma-exposed individuals without PTSD and non-trauma-exposed controls (Kitayama, Vaccarino, Kutner, Weiss, & Bremner, 2005). It is unclear whether lower hippocampal volume is a risk factor for PTSD or consequence of trauma exposure. A study that examined identical twins pairs suggests lower volume may be a pre-existing risk factor. Gilbertson et al. (2002) found similar hippocampal volume in the pair with one twin who experienced combat exposure and developed PTSD, and the other with no combat exposure or PTSD. More importantly, those twin pairs had a lower volume than twin pairs with one twin with combat exposure without PTSD and their unexposed twin without PTSD. However, other studies have found reduced hippocampal volume in trauma exposed individuals without PTSD compared to nonexposed controls, which may suggest trauma itself could reduce hippocampal volume (Woon, Sood, & Hedges, 2010).

Functional imaging studies have demonstrated an exaggerated amygdala response when individuals with PTSD are exposed to stimuli similar to their traumatic experience (Liberzon et al., 1999), which may reflect an enhanced conditioned fear response to these stimuli. Indeed,
individuals with PTSD demonstrate an increased amygdala response during fear conditioning and extinction paradigms, compared to non-trauma exposed controls (Bremner et al., 2005; Milad et al., 2009). Notably, overactivity of the amygdala is found in all anxiety disorders, generally in response to disorder specific stimuli (Shin & Liberzom, 2010). However, hypoactivation of the rostral anterior cingulate cortex (rACC) is consistently found with PTSD but not other anxiety disorders (Etkin & Wager, 2007). Authors have postulated that the emotional dysregulation associated with PTSD is a result of reduced activity in the both the rACC and ventral medial prefrontal cortex, both of which fail to inhibit the amygdala (Etkin & Wager, 2007; Elzinga & Bremner, 2002).

1.1.2 PTSD and the Workplace

Relevant to this research is the fact that traumatic events can occur in the workplace, and studies have examined events such as assault, machine-related accidents, horrific injury, and robbery (Harrison & Kinner, 1998; MacDonald, Colotla, Flamer, & Karlinksky, 2003). In a small sample of individuals who experienced such events, 55% were assigned a diagnosis of PTSD, and depression was the most common comorbid disorder (MacDonald et al., 2003). Additionally, approximately 34% of injured workers with resultant pain were found to develop PTSD, with an additional 10% who developed partial PTSD (Asmundson, Norton, Allerdings, Norton, & Larsen, 1998). Work-related traumas can result in chronic PTSD. For example, after an oilrig disaster, which killed over 150 workers, 21% of survivors met diagnosis for PTSD 10 years later (Hull, Alexander, & Klein, 2002).

Preliminary research indicates that work-related trauma and PTSD is associated with a number of negative consequences. A file review of workers receiving compensation for work-related PTSD revealed that only 43% returned to work with their original employer within a 4
year period. Of those workers, 74% had some form of job modification upon returning to work, (e.g., transfer to an alternative job location), and 11% of workers completely switched industries (MacDonald et al., 2003). This research is consistent with the occupational outcomes associated with PTSD from events unrelated to work. For example, individuals with PTSD and partial PTSD are significantly less likely to return to either their pre-trauma work or any other type of employment, compared to those without PTSD (Matthews, Chinnery, Blaszczynski, Silove, & Hillman, 2001; Savoca & Rosenheck, 2000; Zatzick et al., 1997). These individuals also have a tendency to work part-time or return to less-skilled jobs (Matthews et al., 2001; Smith, Schnurr, & Rosenheck, 2005; Zhang, Ross, & Davidson, 2004). When individuals with PTSD are able to work, it is often in a reduced capacity. For example, Breslau, Lucia, and Davis (2004) reported that over a 30-day period, individuals with PTSD and partial PTSD missed an average of 16 and 11 days of work, respectively. Moreover, individuals with PTSD and partial PTSD report significantly more occupational interference than traumatized individuals without significant PTSD symptoms (Matthews & Chinnery, 2005; Stein, Walker, Hazen, & Forde, 1997). The extent of work-related impairment underscores the need to understand PTSD in a workplace context.

1.2 The DSM Stressor Criterion

The DSM-IV lists the presence of a “traumatic event” as the first criterion (Criterion A) for assigning a diagnosis of PTSD. Rosen and Lilienfeld (2008) observed that Criterion A was intended to serve as a “gatekeeper”, meaning that individuals could not qualify for a diagnosis of PTSD unless they experienced a specific type of a traumatic event. Underlying this gatekeeping function is the assumption that the resulting symptoms are causally related to the event. Indeed, McNally (2009) argued that the stressor criterion is central to the PTSD diagnosis because many
symptoms are directly about “something” (i.e., the trauma) such as intrusive thoughts, nightmares, and avoidance of trauma reminders. Given the central role of the traumatic event, the challenge for researchers and clinicians has been to determine what constitutes a trauma as opposed to an unpleasant and stressful, but not traumatic life event. Since the inception of PTSD, successive DSM editions moved from attempts to objectively define trauma in terms of the nature of the event itself to incorporate more subjective definitions that rely on the individual’s perception and response to the event. A brief review of the DSM definitions follows.

1.2.1 The DSM-III

PTSD first appeared in the third edition of the DSM (DSM-III; APA, 1980). In defining the traumatic stressor, the DSM-III adopted a focus on objective criteria in an attempt to identify events that would most likely result in PTSD. Indeed, some writers have argued that the Criterion A stipulation that the event would “evoke significant symptoms of distress in almost everyone” was intended to exclude an individual’s idiosyncratic reaction (e.g., reacting strongly to a common event) as a basis for determining whether an event was a “trauma” (Weathers & Keane, 2007a). This language also suggested that the authors envisioned a specific etiological linkage between traumatic events and PTSD, i.e., a traumatic event would lead to PTSD in all instances (cf. Rosen & Lilienfeld, 2008). Within the accompanying text was the assertion that traumatic stressors are “generally outside the range of usual human experience.” This description was formally added to Criterion A in the DSM-III-R (APA, 1987). Weathers and Keane (2007a) argued that this addition to Criterion A underscored event magnitude as a defining feature of the traumatic stressor because events outside of usual human experience are often extreme or of catastrophic severity. Put another way, the more severe the stressor, the more severe the reaction, with the most severe reaction being PTSD. Furthermore, it was assumed that as the severity of
the stressor increased, the importance of individual factors in predicting subsequent PTSD decreased (Breslau & Davis, 1987a). Finally, the DSM-III and DSM-III-R indicated that some stressors would frequently produce PTSD (e.g., torture), whereas other would produce it only occasionally (e.g., natural disaster or car accidents).

As research progressed, it became evident that even very severe events did not evoke marked distress in most people. For example, epidemiological research using the DSM-III-R criteria found that 69% of individuals had experienced a potentially traumatic event; however, only 7.4% met diagnosis for PTSD. Furthermore, the events associated with elevated prevalence rates of PTSD were not necessarily outside the range of human experience, and included such experiences as sexual assault (13.6%), physical assault (13.3%), and motor vehicle accidents (11.5%). In fact, these prevalence rates were higher than those for events considered outside of usual human experience such as combat (2.2%), and tragic accidents (7.6%; Norris, 1992). Thus, more common events were more conducive to PTSD than the events highlighted in the DSM-III-R description of a traumatic stressor.

1.2.2 The DSM-IV

The DSM-IV made a marked move away from the objective definition of a traumatic stressor. First, the requirement that the event be “outside the range of usual experience” was removed and replaced with a requirement that the person experience, witness, or be confronted with an event that involved actual or threatened death or serious injury, or threat to the physical integrity of self or others (Criterion A1). The DSM-IV also formally added the subjective response of the individual to the decision as to whether an event was sufficient to cause PTSD. Specifically, the person must have experienced intense fear, helplessness, or horror during or shortly after the traumatic event (Criterion A2). These emotions were thought to be important in
the etiology of PTSD, and were predicted to increase the diagnostic sensitivity of the stressor criterion. Furthermore, the inclusion of emotions specific to survival situations continued the emphasis on the traumatic nature of the stressor, separating these events from daily stressors. The result of these revisions was a reduction in the onus on the clinician to determine if an event was objectively traumatic.

Despite attempts to refine the definition of Criterion A, problems remained. The broadening of eligible events in the DSM-IV increased the number of people who experienced a traumatic event, with estimates as high as 90% (Lee & Young, 2001). However, the overall prevalence rate of PTSD remained constant, with 8-9% of people meeting diagnostic criteria during their lifetime (APA, 1994). Thus, the new criteria did not affect the rate of people with PTSD, despite their broader nature. Criterion A2 also received increasing criticism for lacking predictive utility. For example, Breslau and Kessler (2001) found that of the representative sample of Criterion A1 traumatic events reported by participants, 76.5% of the events were accompanied by intense fear, helplessness, or horror. Similarly, Brewin, Andrews, and Rose (2000) found that 89% of people who developed PTSD experienced a Criterion A2 emotion, however, 44% of people who did not develop PTSD also reported intensely experiencing a Criterion A2 emotion. Overall, when using the current Criterion A definition many people experience a Criterion A2 emotion but do not develop PTSD, but those who develop PTSD likely meet Criterion A2 (see also, Creamer, McFarlane, & Burgess, 2005).

When considered together, Criterion A1 and A2 have demonstrated a low conditional probability (i.e., the percentage of people meeting PTSD criteria after experiencing a qualifying Criterion A traumatic stressor). Breslau and Kessler (2001) reported that the conditional probability of PTSD for people who reported Criterion A1 events was 9.2%, and that the
addition of Criterion A2 only minimally increased the conditional probability of PTSD to 12.0%.
Etiological specificity, i.e., a causal link between Criterion A events and PTSD, would be
reflected in a high conditional probability (i.e., most people who experienced such an event
should develop PTSD). The low conditional probability indicates that the etiological connection
between traumatic events and PTSD symptoms has remained elusive.

1.2.3 The DSM-V

The revisions for the fifth edition of the DSM are near completion and the proposed
changes to Criterion A mark a deliberate attempt to specify the types of events that qualify as a
traumatic stressor (APA, 2009). For example, ambiguous terminology (e.g., threat to physical
integrity) has been removed. Moreover, although the method of exposure to these events has
remained largely the same, there are some additional restrictions. The event must now be
experienced in person (i.e., directly or witnessed), thus ruling out exposure through media, with
the exception of learning about a violent or accidental event that occurred to a close
friend/family member.

These Criterion A events are now classified under four specific categories. Three of these
categories are similar to DSM-IV descriptions, namely: a) death, b) serious injury, and c) sexual
violation. Relevant to this study is the fourth category of permissible traumatic stressors, which
acknowledges the unique experiences of professions such as first responders. According to the
DSM-V revisions, Criterion A can now be met by experiencing repeated or extreme exposure to
aversive details of a traumatic event, such as a first responder collecting human remains or a
police officer repeatedly exposed to the details of child abuse. Under this category, exposure
through electronic media, television, movies, or pictures, is permitted as long as it is work-
related, e.g., a police officer who is required to review videos of torture or child sexual abuse.
Finally, the proposed revisions include the removal of the subjective component of Criterion A2 due to its lack of predictive utility. Overall, the proposed changes to Criterion A arguably represent a shift in focus back on objectively defined events.

1.2.4 Summary

Clearly, the DSM-IV stressor criteria are not fully capturing the characteristics of a traumatic stressor, and thus there is only a weak etiological connection with Criterion A and consequent PTSD. The question then arises, what differentiates two events that meet the current Criterion A definition, one which results in PTSD, and the other which does not? This line of questions points toward the need to distinguish the defining characteristics of such events, i.e., those characteristics that are common among the events that lead to PTSD as opposed to those that do not. In other words, what trauma characteristics, beyond those outlined in the DSM-IV, make an event traumatic?

1.3 The Traumatic Stressor

Most research examining the relationship between the etiological traumatic stressor and resultant PTSD symptoms has focused on broad categories of events (e.g., physical attack, severe automobile accident, and robbery), many of which are described in the DSM-IV as potential traumatic stressors (i.e., specific examples of Criterion A1). I have used the term “categories” to refer to specific examples of Criterion A1. I have used the term “characteristics” to refer to descriptions of the event that would not necessarily meet Criterion A1 (e.g., the event was chaotic). I first review research examining categories and then examining other characteristics that could potentially transcend trauma categories to help define a traumatic stressor. The research reviewed on trauma characteristics relies on individuals’ perceptions of the events, and
the term trauma characteristics reflect these perceptions rather than objective (i.e., not relying on self-report) characteristics.

1.3.1 Trauma Categories

A wide variety of events can meet Criterion A1 (i.e., directly experiencing, witnessing, or being confronted with death or injury). However, research points to a number of event categories that are associated with PTSD. Unlike earlier versions, the DSM-IV does not offer any guidance regarding which events are more likely to result in PTSD, except to suggest that events of “human design” may result in PTSD that is especially severe or long lasting (APA, 1994, pg. 464). Research has generally supported this speculation with higher conditional prevalence rates for interpersonal traumas (21-48%), such as combat exposure, childhood neglect/abuse, and sexual assault, than for accidents (8%; Kessler et al., 1995, see also Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993).

1.3.2 Trauma Characteristics

The identification of more specific trauma characteristics is commonly guided by the dose-response model of trauma. According to this model, the severity of PTSD symptoms is directly related to the severity of the trauma. Three dimensions are hypothesized to characterize trauma severity: proximity to the trauma, degree of personal involvement (e.g., injury), and trauma duration. Accordingly, researchers have speculated that events that are directly experienced, damaging, and prolonged should be the most strongly associated with PTSD (e.g., Bowman, 1999). Each of these dimensions has varying degrees of support. Research on physical proximity has generally bore out predictions, with PTSD symptoms and PTSD diagnosis related to being physically closer to an industrial explosion (Rivière et al., 2008) and to the World Trade Centre attacks (Blanchard, Rowell, Kuhn, Rogers, & Wittrock, 2005; Galea et al., 2002; see
However Sprang, 1999). Similarly, individuals with a greater degree of injury demonstrated more severe PTSD symptoms in samples of motor vehicle accident (Blanchard et al., 1996; Hamanaka et al., 2006) and train accident victims (Selley et al., 1997, see however, Dougall, Ursano, Posluszy, Fullerton, & Baum, 2001). In contrast, two studies examining trauma duration found that the length of an assault did not differentiate who developed PTSD at 1 month (Dunmore, Clark, & Ehlers, 1999) or 1 year postassault (Halligan, Michael, Clark, & Ehlers, 2003).

Finally, Foa and colleagues used an animal model to argue that events that are either uncontrollable or unpredictable will be more likely to result in PTSD (Foa, Zinbarg, & Rothbaum, 1992). They defined a trauma as uncontrollable if the individual’s actions have little or no causal impact on the onset or duration of the trauma. They referred to an unpredictable trauma as having no, or very few, cues predicting its onset or end. Despite behavioural definitions of controllability and predictability (e.g., cues before stimulus onset), the authors asserted that it may be the perception of these constructs that is most important. These appraisals can result from previous learning experience with the environment as controllable/uncontrollable (i.e., overarching beliefs), or the individual can make a situation specific decision (c.f., Bolstad & Zinbarg, 1997). Thus, the model can be applied to individuals who experience chronic traumatic stressors and develop corresponding appraisals (e.g., childhood abuse), or to those who experience a single event (e.g., car accident).

1.4 First Responders

First responders (i.e., firefighters, paramedics, and police) illustrate current difficulties with defining the traumatic stressor. These workers experience a number of events that meet Criterion A, but only some events result in ongoing PTSD symptoms. Thus, these groups offer the opportunity to examine what makes an event traumatic by contrasting events that produce
PTSD symptoms with those that do not, something that is not possible with victims of single traumatic events. First responders routinely witness potentially distressing events and sometimes experience threats to their own safety. The vast majority of first responders endorse experiencing at least one Criterion A1 event in the line of duty. More specifically, the literature suggests that 60%-90% of first responders have attended situations involving multiple casualties, 61%-84% have witnessed the death of a child, 46%-84% have experienced the death of a person in care, and 55% have witnessed violence against others (Laposa & Alden, 2003; Regehr, Hill, Goldberg, & Hughes, 2003; Regehr, Hill, Knott, & Sault, 2003). Other common incidents include responding to self-harm, medical emergencies, motor vehicle accidents, and violent incidents (Alexander & Klein, 2001). Notably, first responders also experience threats of violence against themselves (Regehr, Hill, & Glancy, 2000). More broadly, in a large sample of rural and urban volunteer firefighters, 56% indicated that their safety had been threatened at some point during their career (Bryant & Harvey, 1996).

While a significant number of first responders experience a potentially traumatic event, only a subset develops significant PTSD symptoms. Research findings on the precise PTSD prevalence rates are variable for a few potential reasons. First, many studies with first responders have assessed PTSD symptoms (i.e., symptom criteria) using self-report measures, some of which do not include the full PTSD symptom criteria (e.g., Impact of Event Scale). Second, some studies have asked participants to rate their PTSD symptoms related to a work incident, whereas others permitted participants to choose an event from their personal life. Prevalence rates of PTSD from studies that have assessed work-related events with measures that assess all the PTSD symptom criteria range from 7-8% for police (Carlier, Lamberts, & Gersons, 1997;
Martin, Marchand, Boyer, & Martin, 2009), and 12% for firefighters and paramedics (Bryant & Guthrie, 2007; Van der Ploeg & Kleber, 2003). When other studies are considered, some with the methodological limitations noted above, the percentage of paramedics and firefighters within the various levels of PTSD symptom severity are as follows: 20%-30% in the high-severe symptom range, 14%-30% in the moderate range, and 40-44% in the low range (Alexander & Klein, 2001; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; Regehr, Goldberg, & Hughes, 2002; Regehr, Hill, Goldberg, et al., 2003). For police, estimates of probable PTSD range from 17% to 31.9% (Asmundson & Stapleton, 2008; Chopko & Schwartz, 2012).

1.4.1 Work-related Traumatic Stressors

A great deal of research has examined categories of events that are stressful for first responders. In this section, I keep the same definitions outlined earlier for categories and characteristics of events. I also examine research on the categories of events first and then move to trauma characteristics. However, only a small number of studies have examined event characteristics for first responders, therefore I also draw from research on other professions (e.g., emergency room personnel and military) that confront situations similar to those of first responders.

1.4.1.1 Criterion A Trauma Categories

When authors have examined the distress associated with specific trauma categories the method has commonly been to have participants identify their most distressing or disturbing event. First responders typically choose events involving children (e.g., injury, death, or abuse) as their most distressing (Alexander & Klein, 2001; Clohessy & Ehlers, 1999; Haslam & Mallon, 2003; Van der Ploeg & Kleber, 2003). Other distressing events identified in these studies included dealing with burn patients, treating patients with severe injuries, and handling dead
bodies or body parts. Events have also been defined as distressing if they evoke a Criterion A2 emotion. Declercq, Meganck, Deheegher, and Van Hoorde (2011) asked a group of military nurses and ambulance personnel if they experienced a Criterion A2 emotion, of at least a moderate level, during or following various types of events. Over 50% of participants experienced a Criterion A2 emotion during events that involved children (e.g., sexual abuse, injury, and death due to adult neglect) and coworkers (e.g., suicide or death of a colleague). Their results further support the importance of events involving child victims, but also underscore the importance of events that threaten coworkers.

Other studies have explicitly compared PTSD symptoms for events that involved threat, either to the first responder or a colleague, to events that were witnessed happening to someone else (often the public). Alden, Regambal, and Laposa (2008) compared two groups of emergency room nurses, one group (34% of the sample) whose worst workplace traumatic event involved a direct threat to themselves (e.g., assault), and a second group whose worst event was witnessed (e.g., severe patient injury). The two groups did not differ in the prevalence of PTSD or severity of PTSD symptoms, although the group who experienced a direct threat to themselves reported higher levels of ongoing arousal. McCaslin et al. (2006) found similar results in a sample of police officers when they coded the officers’ worst event on one of five dimensions (personal life threat, duty related violence, encountering physical/sexual assault, civilian death, and other). The only statistically significant difference found between the events was higher hyperarousal scores for officers whose worst event involved personal threat and duty related violence when compared to officers whose worse event was a civilian death. Not all studies have found the same pattern. In a group of 131 firefighters, PTSD symptom severity scores did not differ regardless of the worst event identified, including death of adult, death of child, being injured or
nearly killed, attending a plane crash, or death of firefighter (Del Ben, Scotti, Chen, & Fortson, 2006).

Factor analytic studies attempting to collapse across categories of events have generally supported the above results. Beaton, Murphy, Johnson, Pike, and Corneil (1998) conducted a factor analysis on incidents that firefighters rated as stressful. Notably, firefighters were asked to rate incidents regardless of if they had experienced the event or not, which required some firefighters to speculate on their answer. The factor that accounted for the most variance was catastrophic injury to self or coworkers (e.g., witness death of coworker, third degree burn to self). Consistent with other research, the second most important factor was gruesome victim injuries (e.g., suicides, mutilation). Other factors included rendering aid to a seriously injured vulnerable victim, minor injury to self, and exposure to death and dying.

Similarly, Carlier, Lamberts, and Gersons (2000) asked police officers to rate 15 work-related critical incidents in terms of similarity and then used multidimensional scaling to identify cognitive dimensions used by police officers to discriminate between these incidents. The results fell on three dimensions. The first dimension of events included seeing accident victims, performing an unsuccessful resuscitation, and discovering a corpse. On the second dimension, high item loadings were found for events where officers were vulnerable, such as defending themselves in dangerous situations. The third dimension was characterized by events where the responsibility of actions laid with the officer such as shooting incidents, and performing a resuscitation. Notably, only the second dimension was related to PTSD status.

1.4.1.2 Other Characteristics

There is some evidence supporting the application of the dose-response model in understanding the nature of traumatic stressors for first responders. Mirsa, Greenberg,
Hutchinson, Brain, and Glozier (2009) found support for the role of proximity to the trauma when they compared paramedics with and without probable PTSD who provided services during the 2005 London bombings. Paramedics with probable PTSD were more likely to have had a role directly on the scene, rather than at the hospital. In terms of personal involvement, injury was one of the strongest predictors of PTSD symptoms and PTSD status in samples of police officers involved in either the September 11th terrorist attacks or hurricane Katrina. (Perrin et al., 2007; West et al., 2008). However, McFarlane, Rafalowicz, and Papay (1994) did not find a difference in the number of injuries, or duration of exposure for firefighters involved with a major bush fire who developed PTSD, compared to those who did not develop PTSD.

Uncontrollable and unpredictable events may be especially salient for first responders given that such events could become life threatening. For first responders, predictability allows for preparation and the application of protocols, whereas controllability is important in the management of potentially volatile situations (e.g., police officers controlling a crowd). Two studies support the potential importance of these variables. When volunteer firefighters were asked what events threatened their safety, 35% indicated unpredictable fires in which they became trapped (Bryant & Harvey, 1996). Furthermore, 55% of police officers indicated having no or very little control during their most distressing event (Colwell, Lyons, Bruce, Garner, & Miller, 2011).

Other promising characteristics pertain to first responders’ need for resources to perform their duties in the midst of potentially traumatic events. Bacharach, Bamberger, and Doveh (2008) examined the moderating relationship of the availability and quality of both “material resources” (e.g., having equipment to perform duties in the field, firehouse, and to maintain safety) and “conditional resources” (e.g., training and preparedness for routine and mass casualty
events) on firefighters’ current distress levels (e.g. agitation and difficulty “winding down”). Firefighters who were members of units with less adequate resources were more likely to be experiencing distress than members with more adequate resources. Research with Vietnam veterans has directly linked resource variables to PTSD symptoms. In one sample, being separated from the combat unit was associated with significantly higher levels of PTSD, when compared to veterans who had not been separated (Breslau & Davis, 1987b). In another sample, troops stationed in the countryside were more likely to work in a harsh environment, which in turn predicted insufficient resources (e.g., inadequate weapons or munitions, inadequate equipment or supplies, and loss of freedom of movement). Ultimately, there was a direct link between resource insufficiency and PTSD symptoms. Resource insufficiency was also associated with an increased perception of threat and the potential for death or injury to oneself (Fontana & Rosenheck, 1999).

Weiss, Marmar, Metzler, and Ronfeldt (1995) developed an Incident Exposure Scale to measure exposure to operational stressors experienced by first responders during the Nimitz Freeway collapse, some of which overlap with the conditions identified with Fontana and Rosenheck (1999). This measure included questions from four dimensions. Two dimensions assessed Criterion A descriptors (i.e., risk of personal injury or loss of life during the rescue operation, and viewing or handling bodies/body parts) and two assessed other trauma characteristics (i.e., harsh weather conditions and deprivation of personal needs, and failure to receive clear communication from command centre). The authors combined all the questions into a single scale. Marmar et al. (1999) found that scores on the exposure scale predicted PTSD symptoms measured approximately 3.5 years after the earthquake.
When first responders are confronted with urgent and unfamiliar events or duties, they may need to respond without the proper training (i.e., inadequate “conditional resources”). Perrin et al. (2007) surveyed individuals from different occupations (i.e., police, firefighters, emergency medical services/disaster personnel, sanitation workers, and other volunteers) who worked at least one shift at the World Trade Center disaster. Being involved in tasks that were atypical for an individual’s profession had the strongest association with probable PTSD (e.g., police performing emergency medical services or firefighting, or firefighters performing light construction). The authors related this finding to the role of prior training or experiences as a protective factor when confronted with unusual duties during a potentially traumatic event.

The need for first responders to work as a team while providing emergency services makes the interpersonal climate an important factor in the experience of a traumatic event. A number of studies have explored how the perceived social climate impacts the development of PTSD symptoms after a distressing event. Indeed, depending on the nature of the support, it can either buffer or exacerbate PTSD symptoms. In general, social support from peers, supervisors, and family have all been associated with lower PTSD symptoms in first responders (Corneil et al., 1999; Lowery & Stokes, 2005; Regehr, Hill, Knott, et al., 2003). For emergency room nurses, a general environment with interpersonal conflict was significantly associated with greater PTSD symptom severity (Laposa, Alden, & Fullerton, 2003). Additionally, social support from colleagues during or immediately after a trauma predicted the PTSD status of police officers (full/partial PTSD vs. no PTSD), even when dissociation, personality, beliefs, and demographics were controlled. Notably, in this sample, support from supervisors was not a significant predictor (Martin et al., 2009). Clearly, more research is needed to determine whether
perceived social support at the time of the critical incident affects the development of PTSD symptoms, and is pertinent to understanding the traumatic stressor.

First responders are often required to provide services under very demanding circumstances. For example, large-scale traumas may involve multiple victims, the need to control bystanders, and multiple sources of danger. Alden and colleagues developed a questionnaire to examine event characteristics of emergency room nurses’ most distressing Criterion A work-related event. Multiple traumas emerged as a factor and it was the only characteristic related to current PTSD symptoms. Other factors that were descriptive of the event included a breakdown in communication and teamwork, personal significance (e.g., family was present, or the victim was known), and unexpected/uncontrollable events (Alden, 2005). Many of these characteristics reflect the literature reviewed earlier.

To my knowledge, no study has directly compared the relative contribution of meeting Criterion A and other trauma characteristics in predicting PTSD symptoms. Brown, Mulhern, and Joseph (2002) conducted a study that can shed some light on the relative importance of these types of characteristics, although their purpose was not to examine Criterion A and trauma characteristics. The authors conducted a factor analysis on firefighters’ frequency ratings of a number of incident stressors. It should be noted that not all the stressors occurred at the time of a critical incident (e.g., not being able to learn afterward what has happened to a victim), so the authors did not examine the incident stressors in the same way as the current study examined trauma characteristics. The first factor, labeled Traumatic Incident Related Stressors, encompassed descriptors of events reflective of Criterion A1 (e.g., attending explosions and accidents involving children). The second factor, labeled Negative Cognitions and Emotions, encompassed what I have referred to as trauma characteristics, such as concern for the safety of
self/colleagues or other road users on route to the accident, not having enough personnel to deal with the incident, being worried about damaging a vehicle, and having trouble finding an incident scene. A total exposure score was created for each participant on each factor. The authors did not explore the association between these factors and PTSD symptoms, but scores on the General Health Questionnaire were only related to higher scores on the second factor, Negative Cognitions and Emotions. In other words, higher exposure to incident-related characteristics was more deleterious for health than for higher exposure to the Criterion A aspects of the event (i.e., the first factor).

Overall, the literature points to a number of characteristics that have the potential to influence both how an event is experienced and its lasting effects. These characteristics include degree of involvement, uncontrollability, unpredictability, availability of resources, social support, and multiple demands. Notably, many of the studies reviewed asked first responders to estimate the distress associated with critical incidents, or measured characteristics of the general environment (e.g., average availability of resources). The current study made the novel contribution by examining diverse event characteristics for a single event experienced by the individual, and then determined if those characteristics influenced whether that event was associated with lasting distress or not.

1.4.2 Rural First Responders

A specific focus of the current study was rural and rural-urban first responders, a population that has largely been understudied, and who are often subjected to the salient trauma characteristics outlined above. Rural and smaller urban areas present unique challenges in providing emergency services. In particular, rural first responders are more likely to experience social and professional isolation, and reduced anonymity (Oliver & Meier, 2004). They are also
more likely to provide emergency services to people with whom they have some personal acquaintance. At the scene, these responders may be less likely to have access to professional backup (e.g., specialist physicians) and may have limited access to sophisticated technology. These factors could result in an increased sense of personal responsibility for negative outcomes, as well as a sense of powerlessness in coping with some types of work demands.

Overall, rural first responders represent a population whose work requires them to confront many trauma characteristics hypothesized to play a role in the development of PTSD symptoms, including resources availability, and physical isolation. However, little is known about how rural and small urban settings influence the development of PTSD symptoms. Indeed, the literature lacks even basic prevalence rates. Thus, while adding to the theoretical understanding of the traumatic stressor, and subsequent PTSD symptoms, another novel contribution of this study was to address the lack of research on rural first responders.

1.5 Cognitive Models of PTSD

The predominant cognitive models (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000) highlight the role of cognitive processes before, during (i.e., peritraumatic), and after the traumatic event. Following from these models, critical trauma characteristics would be expected to affect peritraumatic cognitive processing and posttrauma cognitions, and hence the development of PTSD. However, the role of trauma characteristics beyond Criterion A has not received as much attention in the context of cognitive models. Thus, the current focus on identifying which characteristics define a traumatic stressor offered a unique opportunity to test underlying assumptions of cognitive models of PTSD. Determining the trauma characteristics that are associated with critical cognitive processes could provide information about how crucial
situational features might lead to subsequent PTSD symptoms and PTSD (i.e., through influencing these processes). Each of these two main cognitive components are discussed in turn.

1.5.1 Peritraumatic Processing

Cognitive theorists hypothesize that how the event is processed (i.e., peritraumatic cognitive processing) affects memory stores. Peritraumatic processing that favors sensory information (e.g., sights and sounds) and interferes with conceptual processing (e.g., making sense of the event in its context) is believed to be more likely to result in PTSD (e.g., Ehlers & Clark, 2000). Specifically, sensory processing is hypothesized to render the trauma memory susceptible to being triggered by physically similar cues (e.g., a shiny object triggering the memory of being assaulted with a knife), thereby resulting in an intrusive memory or flashback.

Many theorists consider dissociation to be a marker of “disrupted” cognitive processing. Indeed, dissociation is defined as a “disruption of the usually integrated functions of consciousness, memory, identity, or perception of the environment” (APA, 1994, p. 822), and is measured by self-reported alterations in cognitive and perceptual functioning. Dissociation has been shown to promote the processing of sensory and emotional impressions of an event, which later characterized the trauma memory (Engelhard, Van den Hout, Kindt, Arntz, & Schouten, 2003). Individuals frequently report experiencing dissociation during traumatic events (Shalev, Peri, Canetti, & Schreiber, 1996; Ursano et al., 1999). A large body of literature has linked peritraumatic dissociation to the development and maintenance of PTSD (Birmes et al., 2003; Clohessy & Ehlers, 1999; Ehlers, Mayou, & Bryant, 1998; Holmes, Brewin, & Hennessy, 2004; Murray, Ehlers, & Mayou, 2002). In regards to first responders, several studies have shown dissociation to be one of the strongest predictors of PTSD symptoms and PTSD, even when controlling for personality factors (Hodgins, Creamer, & Bell, 2001), prior beliefs, cumulative
critical incident exposure (McCaslin et al., 2008; Meffert et al., 2008), and trauma severity (Hodgins et al., 2001; Martin et al., 2009).

Cognitive theorists hypothesize that the nature of peritraumatic processing makes it susceptible to disruption by trauma characteristics. For example, Ehlers and Clark (2000) postulated that traumas that are characterized by unpredictability (e.g., being hit from behind during a car accident), and longer in duration will result in more sensory processing than conceptual processing. Dissociation has been related to objective trauma severity (Shalev et al., 1996; van der Velden et al., 2006; see however, Van Loey, Maas, Faber, & Taal, 2003). Moreover, Marmar, Weiss, Metzler, and Delucchi (1996) found that their Incident Exposure Scale was a significant predictor in a logistic regression classifying first responders who experienced no/minimal peritraumatic dissociation and those who experienced moderate/high levels. Interestingly, the finding of Alden (2005) that multiple traumas predicted PTSD symptoms in emergency room nurses is congruent with cognitive models in that multiple demands likely tax the cognitive resources of the individual, which alters peritraumatic processing and results in PTSD symptoms. Thus, determining the trauma characteristics that are associated with critical cognitive processes could help to identify the crucial situational features that lead to subsequent PTSD symptoms and PTSD.

1.5.2 Posttrauma Cognitions

Many theorists underscore the importance of an individual’s cognitions in explaining the aftermath of a traumatic event. The specific type of cognition implicated varies depending on the focus of the model, and can involve beliefs, schemas, and appraisals. However, most theories address cognitions related to the self, others, and the world. For example, an early influential model proposed by Janoff-Bulman (1992) asserted that beliefs about the world being benevolent
and meaningful, and the self as worthy are the most significant contributors to an individual’s response to a trauma. Foa and Riggs (1993), and Foa and Rothbaum (1998) proposed that two central schemas mediate the development of PTSD: the world is completely dangerous, and one’s self as totally incompetent. More recently, cognitive theorists have highlighted appraisals related to the sequelea of the traumatic event. Ehlers and Clark (2000) proposed that a sense of current threat after the trauma results from biased posttrauma appraisals in various domains. For example, individuals may hold excessively negative appraisals of their actions during the trauma (e.g., I could have prevented the trauma), their personal vulnerability (e.g., I attract disaster, bad things always happen to me), and their PTSD symptoms (e.g., I am losing my mind).

The Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) was derived from major theories of PTSD, including those previously discussed, to assess negative cognitions (i.e., appraisals and beliefs) about the self, the world, and self-blame. Research with the PTCI has largely supported cognitive models. Individuals who experienced a Criterion A event demonstrated a significant correlation, of medium to large effect, between the PTCI total score and PTSD symptoms (Belsher, Ruzck, Bongar, & Cordova, 2012; Bennett, Beck, & Clapp, 2009), as well as symptoms of acute stress disorder (Elsesser, Freyth, Lohrmann, & Sartory, 2009). Each of the three subscales were also significant independent predictors of PTSD symptoms when controlling for depression (Daie-Gabai, Aderka, Allon-Schindel, Foa, & Gilboa-Schechtman, 2011). Additionally, Kleim, Ehlers, and Glucksman (2007) used the PTCI-self subscale to predict PTSD status, and found that it was significant even when controlling for demographic and peritraumatic variables. Similarly, Pyevich, Newman, and Daleiden (2003) developed a composite measure of cognitions about the world, including the PTCI subscale, which predicted PTSD symptoms for journalists after controlling for personal trauma exposure,
and the combined severity and frequency of traumatic work events. The PTCI is also significantly higher for trauma-exposed individuals with PTSD compared to individuals without PTSD (Beck et al., 2004; Ehlers et al., 2010). These cognitions have also demonstrated prospective predictive utility. Residualized PTCI total scores measured 4 weeks after a MVA predicted residualized PTSD symptoms 16 weeks postaccident (Robinaugh et al., 2011). Additionally, in a sample of individuals who had suffered a stroke, the PTCI self and world subscale scores taken during the hospital admission correlated with PTSD symptoms 3 months after discharge, although none were significant predictors when entered together into a regression equation controlling for initial depression and anxiety (Field, Norman, & Barton, 2008).

Theorists have proposed several pathways through which cognitions may contribute to psychological changes after a traumatic event, including the development of PTSD. These pathways typically involve either the change of positive pretrauma cognitions (e.g., the world is safe), or the confirmation of negative cognitions (e.g., the world is dangerous). Specifically, overly positive beliefs may be “shattered” by the trauma and not allow the trauma experience to be integrated into one’s worldview (Janoff-Bulman, 1992). Similarly, Foa and colleagues stress that the individual may have difficultly assimilating the trauma into their previous overly positive views, and therefore over-accommodate their beliefs to become overly negative (e.g., the world is a completely dangerous place). If vulnerable beliefs were present before the trauma, the event may prime their presence (Foa & Riggs, 1993; Foa & Rothbaum, 1998). In addition, Ehlers and Clark (2000) postulated that cognitions may influence how the trauma is processed (e.g., when beliefs are shattered it may be difficult to process the trauma) and retrieved (e.g., aspects of the event consistent with negative beliefs may be selectively retrieved).
The influence of trauma characteristics on PTCI-type cognitions has not received as much empirical attention. Theoretically, Ehlers and Clark (2000) predicted that event characteristics can have a lasting effect on an individual’s beliefs. The authors provided an example of a potential situation during which an individual who perceives no control over a traumatic situation may interpret this situational lack of control as evidence that he or she has little control over life in general.

In summary, cognitive models provide a theoretical framework for understanding the peritraumatic and posttrauma factors that contribute to the development of PTSD. Furthermore, characteristics of the trauma itself are predicted to influence both peritraumatic processing and posttrauma cognitions. Understanding how contextual factors influence these cognitive variables might advance these models. Moreover, understanding the link between trauma characteristics and cognitive processing might facilitate early identification of those situations that are likely to result in PTSD; proactively addressing these characteristics would reduce their influence. These practical implications are especially important for professionals who experience repeated trauma exposure at their place of work, such as first responders. One goal of this research was to address these issues.

1.6 Overall Summary

One of the main criticisms of Criterion A is that many people experience events that present threats of serious injury or death, but only a small portion experience lasting symptoms of PTSD. This suggests that Criterion A does not fully capture the characteristics of a traumatic stressor that cause lasting distress. There is a small body of research that has examined other characteristics of the traumatic stressor. Although this literature offers valuable insight into the traumatic stressor, it also has some methodological issues that make it difficult to draw solid
conclusions, such as estimating the relevance of characteristics and measuring characteristics without reference to a specific event. Furthermore, no study to date, to my knowledge, has examined many of these characteristics in one study. Finally, even less research has examined how trauma characteristics influence cognitive processes, as suggested by cognitive models.

1.7 Current Study

The overarching purpose of this study was to identify characteristics of Criterion A1 events (i.e., events that presented a threat of serious injury or death) that evoked extreme amounts of distress (i.e., PTSD symptoms), and to determine if these characteristics were more relevant for such events compared to similar events that did not cause extreme distess. Toward this goal, the current study examined two types of Criterion A1 events: events that were associated with lasting distress (i.e., distressing event) and events that were not associated with symptoms of lasting distress (i.e., control event). Information about these events was gathered from first responders because they repeatedly experience Criterion A1 events, which allowed them to rate the relevance of event characteristics for both types of events. Thus, the event characteristics of this study reflect their perception of these characteristics and of the traumatic stressor. To my knowledge, this was the first study to use a repeated-measures design to study the DSM-IV traumatic stressor. Using this methodology, this study addressed four central objectives involving PTSD traumatic stressors, each is described in turn.

1.7.1 Objective One

The first objective of this study was to identify trauma characteristics that first responders perceived to be relevant for distressing (i.e. causing lasting symptoms of PTSD) Criterion A1 events. The literature suggests that many characteristics of an event may make it more distressing; however, to my knowledge, no study has examined many of these characteristics
together. This study aimed to take this next step by examining how these characteristics were related and then summarizing these relationships into themes. To this end, the characteristic descriptors were selected to represent the characteristics currently identified in the literature as being potentially important to making an event distressing. Characteristics of focus included severity, availability/quality of resources, degree of involvement during the incident, teamwork/support, and controllability/unpredictability. Given that this was the first study to examine all of these characteristics together, there were no specific hypotheses about the final themes that would emerge from these characteristics.

1.7.2 Objective Two

The second objective of this study used a repeated-measures comparison to determine if the characteristics identified as descriptive of the distressing events in Objective One were perceived as more relevant for those events compared to the control events. If characteristics were only assessed for distressing events that lead to PTSD symptoms, there would be no way of knowing if these characteristics were equally relevant to events that do not lead to PTSD symptoms. For example, although teamwork breakdown may be salient during an event that produces PTSD, it may also be associated with events that do not produce PTSD. In this case, the teamwork characteristic would not improve the gate-keeping function of Criterion A (i.e., as a screening tool for those likely to develop PTSD based on the type of event they experienced).

1.7.3 Objective Three

The third objective was to address whether the identified characteristics added incremental value in predicting current PTSD symptoms above meeting Criterion A. To this end, participants were classified as either meeting or not meeting Criterion A. Criterion A was then entered as a predictor of PTSD symptoms. Next, the trauma characteristics were entered in order
to pit their strength of prediction directly against that of meeting Criterion A. This analysis served to determine whether these characteristics helped increase the predictive ability of the traumatic stressor (i.e., account for significant variance in PTSD symptoms above Criterion A). Given the low association between Criterion A and PTSD, I predicted that these characteristics would add predictive value.

1.7.4 Objective Four

The fourth objective was to test the hypothesized relationships between the traumatic stressor and the cognitive processes implicated in cognitive models. Although these models make a number of predictions about the role of the traumatic stressor, they remain largely untested, particularly with trauma characteristics other than those related to Criterion A. I focused here on two main cognitive processes, peritraumatic dissociation and posttrauma cognitions, both of which are considered by cognitive theorists to be key variables in the development and maintenance of PTSD symptoms. Figure 1 presents the hypothesized relationships. In congruence with cognitive models, I predicted that event characteristics perceived as relevant for describing the traumatic event would affect cognitive processing at the time of the trauma, and in particular promote maladaptive processing, i.e., dissociation. Furthermore, I also predicted that the trauma characteristics would contribute to higher levels of posttrauma cognitions. Finally, I predicted that both dissociation and posttrauma cognitions would predict PTSD symptoms. Of particular interest was whether dissociation and posttrauma cognitions would mediate the relationship between trauma characteristics and PTSD symptoms. Current cognitive models do not directly state whether this is a mediated relationship. To test this relationship a direct association was also included between the event characteristics and PTSD symptoms.
Figure 1  Proposed Test of Variables in Cognitive Models of PTSD
2. Methods

2.1 Participants

Participants were active members of three first responder organizations: the Royal Canadian Mounted Police (RCMP, E Division), the British Columbia Ambulance Services (BCAS), and volunteer firefighters. To maintain the focus on northern and rural first responders, participant recruitment was limited to the Northern Region/District as defined by the RCMP and BCAS.

Approximately 1000 questionnaires were distributed to 38 RCMP detachments, 31 BCAS stations, and eight volunteer firefighter stations. This represents the approximate number of the personnel employed, or volunteering, in those detachments or stations at the time of participant recruitment. The distribution estimate does not represent the number of questionnaires that were actually provided to individual first responders. This number cannot be determined because in many situations the questionnaires were mailed or left with a contact person at the station/detachment; the research team had no way of knowing how many of those questionnaires were actually distributed, with the exception of the eight fire stations visited by the Research Assistant (see Participant Recruitment section). 249 questionnaires were returned, of which 205 had sufficient data for subsequent analysis. Participants were included in the analysis only if they chose a single Criterion A1 type event for both their distressing and control event. Furthermore, the events must have occurred while providing first response services. Participants were classified as choosing a Criterion A1 event by meeting one of three criteria: (a) endorsement (i.e., score of 1 or above) of at least one of the two Criterion A1 questions from the Posttraumatic Diagnostic Scale (PDS) (i.e., possible death or severe injury to oneself, or possible death or severe injury to another person); (b) endorsement of one of the 13 PDS event categories; or (c)
reflection of Criterion A1 in the written description of the event. Thirteen participants were excluded because they did not choose a Criterion A1 event, and two participants were excluded because they did not choose a single distressing event. Finally, nine participants were excluded because it was suspected that they misunderstood the questionnaire (i.e., chose two distressing events rather than one distressing event and one similar event that did not result in ongoing distress). The final sample consisted of 181 participants.

Participant demographics are presented in Table 1. 98 (54.1%) of the respondents were RCMP members, 43 (23.8%) were volunteer firefighters, and 38 (21.0%) were BCAS members. Two participants (1.1%) did not indicate their profession. The average age was 39.03 years (SD = 11.60). The average department size was 23.97 members (SD = 26.10, range: 1-145 members). The average time participants indicated working in a first responder position was 10.7 years (SD = 8.97, range: 7 months-34.42 years). For those participants who were paid, they reported working an average of 20.32 regular shifts (SD = 9.54, range: 1-58 shifts), and 3.46 overtime shifts a month (SD = 5.08, range: 0-25 shifts). Volunteers reported being called out an average of 33.70 hours per month (SD = 52.65, range: 2-200 hours).

Participants also indicated the type of location where they provided first response services (see Table 1). The population cutoffs and descriptions for each type of location were determined from both previous studies of first responders (e.g., Brown, Dickinson, Misselbeck, & Levine, 2002; Studneck, Ferketich, & Crawford, 2007) and our agency partners. The following classifications were used: Isolated Rural (i.e., less than 2500 people, accessed by dirt roads or air, major medical centre at least 75 km away); Non-isolated Rural (i.e., less than 2500 people, easily accessible, major medical centre within 75 km); Small Town (i.e., population of 2500 to 25,000 people); and Urban (i.e., population of greater than 25,000 people). Consistent
with our target population, the majority of participants indicated working in a small town (43.6%) or rural setting (46.4%).

**Table 1  Participant Characteristics**

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<th>Characteristic</th>
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<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
<td>133 (73.5)</td>
</tr>
<tr>
<td>Female</td>
<td>47 (26.0)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>163 (90.1)</td>
</tr>
<tr>
<td>First Nations or Aboriginal</td>
<td>6 (3.3)</td>
</tr>
<tr>
<td>Metis</td>
<td>4 (2.2)</td>
</tr>
<tr>
<td>Other</td>
<td>7 (3.9)</td>
</tr>
<tr>
<td><strong>Highest Level of Education</strong></td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>1 (0.6)</td>
</tr>
<tr>
<td>High school degree</td>
<td>17 (9.4)</td>
</tr>
<tr>
<td>Some trade, technical, business or community college</td>
<td>25 (13.8)</td>
</tr>
<tr>
<td>Completion of trade, technical, business or community college</td>
<td>53 (29.3)</td>
</tr>
<tr>
<td>Some university</td>
<td>44 (24.3)</td>
</tr>
<tr>
<td>Undergraduate university degree</td>
<td>35 (19.3)</td>
</tr>
<tr>
<td>Graduate/professional school degree</td>
<td>5 (2.8)</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>140 (77.3)</td>
</tr>
<tr>
<td>Part-time</td>
<td>22 (12.2)</td>
</tr>
<tr>
<td>Self-employed</td>
<td>10 (5.5)</td>
</tr>
<tr>
<td>Retired</td>
<td>4 (2.2)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (2.2)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>113 (62.4)</td>
</tr>
<tr>
<td>Common-law</td>
<td>27 (14.9)</td>
</tr>
<tr>
<td>Single</td>
<td>20 (11.0)</td>
</tr>
<tr>
<td>Steady relationship</td>
<td>13 (7.2)</td>
</tr>
<tr>
<td>Divorced</td>
<td>4 (2.2)</td>
</tr>
<tr>
<td>Separated</td>
<td>2 (1.1)</td>
</tr>
<tr>
<td><strong>Area Served</strong></td>
<td></td>
</tr>
<tr>
<td>Small town</td>
<td>79 (43.6)</td>
</tr>
<tr>
<td>Non-isolated rural</td>
<td>44 (24.3)</td>
</tr>
<tr>
<td>Isolated rural</td>
<td>40 (22.1)</td>
</tr>
<tr>
<td>Urban</td>
<td>16 (8.8)</td>
</tr>
</tbody>
</table>
2.2 Measures

2.2.1 The Posttraumatic Stress Disorder Diagnostic Scale (PDS)

The PDS (Foa, 1995) assesses all of the DSM-IV criteria for PTSD. Participants first select their most traumatic event from a list of Criterion A1 events. For this study, the original Criterion A1 list of traumatic events was replaced with a list of 13 work events specific to first responders. This list was developed from classifications used in previous studies. Participants also had the option of describing an event that was not listed. The PDS further assesses Criterion A with five questions asking about the presence (yes or no) of terror, helplessness, horror, possible death or injury to self, and possible death or injury to others. In keeping with the dimensional nature of PTSD symptoms, these questions were modified for this study by having participants rate each of the five components of Criterion A on a four-point Likert-type scale (0 = not at all and 3 = very much).

The presence of PTSD symptoms in the last month is measured on a four-point scale (0 = not at all or only once, and 3 = five or more times per week, or almost always) in relation to the most distressing event. The PDS provides both a symptom severity score and an indication of clinical diagnosis of PTSD. A PTSD symptom severity score (referred to herein as PDS-S) is calculated by summing the 29 questions that assess criteria B, C, and D. The PTSD symptom severity score is interpreted as follows: 1-10 is mild, 11-20 is moderate, 21-35 is moderate to severe, and 36-51 is severe. Ehring, Kleim, Clark, Foa, and Ehlers, (2007) tested a wide range of symptom combination scoring rules for the PDS in five different samples of trauma survivors. A PTSD symptoms cutoff score of 18 met their criteria for diagnostic efficiency. Across the samples, the sensitivity of this cutoff ranged from .82-.83, and the specificity from .80-.96. Finally, the degree of interference associated with PTSD is rated on four-point scale (0 = no
interference, and 3 = severe interference). The original PDS has nine interference questions; however, at the request of our community partners, the question assessing relationship with family was split into two questions assessing the relationship with significant others, and relationship with children.

Several studies have shown the PDS to be internally consistent (α = .92; Foa, 1995). The PDS also has good test-retest reliability and good diagnostic agreement with structured clinical interviews (e.g., kappa = .65, agreement = 82%; Foa, Cashman, Jaycox, & Perry, 1997). Cronbach’s alpha for the PDS-S items was excellent for this sample (α = .91).

2.2.2 Description of Event Questionnaire (DEQ)

The DEQ is a 35-item measure designed for this study that assesses event characteristics thought to be relevant to work-related situations typically experienced by first responders. The DEQ is based on a previous 60-item measure used with emergency room personnel (see Alden, Laposa, Kuhl, McNutt, & Bullock, 2004). A selection of items related to PTSD symptoms in the original emergency room sample was retained. The measure was further modified through discussion with agency representatives to determine what other original items may be relevant to represent the experiences of their personnel in a northern/rural setting. Participants are asked to rate each item on the degree to which it described one target event using a 7-point Likert-like scale, (1 = not at all and 7= very much). The DEQ items assess a variety of characteristics including severity, availability/quality of resources, degree of involvement during the incident, and teamwork/support. For the current study, participants completed this questionnaire for both their most distressing event (DEQ-DIS) and their control event (DEQ-CON).
2.2.3 Peritraumatic Dissociation Experiences Questionnaire (PDEQ)

The PDEQ (Marmar, Weiss, & Metzler, 1997) is a 10-item scale that assesses experiences of dissociation such as depersonalization, derealization, and altered sense of time during a single traumatic event. Each item is rated on a 5-point Likert-type scale (1 = not at all true and 5 = extremely true). The PDEQ has shown good internal consistency (α = .81), and is strongly associated with other measures of general dissociation (Marmar et al., 1997) and prospectively with symptoms of PTSD (e.g., Birmes et al., 2001). Cronbach’s alpha was good for this sample (α = .88).

2.2.4 Posttraumatic Cognitions Inventory-Abbreviated (PTCI-A)

The PTCI-A is a selection of 12 items selected for the current study from the complete 36-item PTCI (Foa et al., 1999) that assess trauma-related thoughts and beliefs. The PTCI-A had participants reference their thinking after their chosen distressing event. The original PTCI is composed of three subscales: Negative Cognitions about Self (Self), Negative Cognitions about the World (World), and Self-Blame. Validation of the PTCI supports the convergent validity and discriminative validity (i.e., traumatized individuals with or without PTSD) of the total scale score and each of the subscales (Foa et al. 1999). Furthermore, high internal consistencies were demonstrated for the total scale (α = .97), and all three subscales, Self (21 items, α = .97), World (seven items, α= .88), and Self-Blame (five items, α =.86). The authors indicated that these high internal consistencies allow the scales to be shortened without compromising their psychometric properties. The abbreviated version used for this study consisted of questions representing each of the three subscales: Self (five questions), World (four questions), and Self-Blame (three questions). The sum of the three subscales was used for this study. The shortened scale demonstrated good internal consistency (α = .83).
2.2.5 Beck Depression Inventory-II (BDI)

The BDI (Beck, Steer, & Brown, 1996) measures the severity of depressive symptoms over the previous 2 weeks. It consists of 21 items, each rated on a scale ranging from 0 to 3, with higher scores indicating greater severity (0 = minimum and maximum = 63). The BDI has high internal consistency (e.g., $\alpha = .92$) and test-retest reliability ($r = .93$) in student and outpatient populations (Beck et al., 1996). Cronbach’s alpha was acceptable for this sample ($\alpha = .95$).

2.3 Procedure

The study was approved by both the University of British Columbia (UBC) and University of Northern British Columbia (UNBC) research ethics boards.

2.3.1 Participant Recruitment

Participants were recruited using two different procedures. RCMP detachments and volunteer firefighter stations that were easily accessible by car from UNBC were offered either the opportunity to have research personnel provide a presentation about the study to available members, or to meet with the commanding officer or chief to explain the study. Our research assistant (RA) visited eight volunteer fire departments and 10 RCMP detachments. When possible, the RA distributed and collected questionnaires. Otherwise, participants returned the questionnaires to UBC in a prepaid envelope. An alternative distribution method was used for those stations/detachments that were not as accessible, those who declined to have the RA visit, and for all BCAS stations. Under these circumstances, the RA phoned commanders/chiefs to provide information about the study and then mailed questionnaires to the detachments/stations. The questionnaires included prepared return envelopes to be mailed to UBC.
2.3.2 Questionnaire Administration

The questionnaire led participants through a series of instructions. First, participants were instructed to choose their most distressing work-related event. Participants were also provided with examples of distress (e.g., dreams, avoidance of event reminders, etc). Specifically, participants read the following instructions:

“Think of an event that you have encountered while providing first response services that was traumatic or caused you significant distress. If you can think of more than one event, pick the one event that stuck with you the most.”

Participants then completed the PDS, DEQ-DIS, PTCI-A and PDEQ in relation to that event.

Participants were then instructed to select their control event after reading the following instructions:

“Think about an event you have encountered while providing first response services that you expected to be traumatic and cause you significant distress (i.e., seemed objectively bad) but DID NOT cause you distress.”

Participants then completed the Criterion A section of the PDS and DEQ-CON in relation to that event. A final section of the questionnaire battery included the BDI and basic demographic information.
3. Results

3.1 Overall Analytic Overview

This section (3.1) provides a brief overview of the analyses. The next eight subsections contain a more specific analytic overview describing statistical considerations and approaches.

Section 3.2 includes a description of the preliminary data preparation for the PDS-S (PTSD symptoms), PDEQ (dissociation), PTCI-A (posttrauma cognitions), and BDI (symptoms of depression).

Section 3.3 provides a description of the PTSD symptoms in this sample.

Section 3.4 compares the distressing and control events on Criterion A categories and emotions from the PDS. Additionally, other event descriptors are analyzed (i.e., injury and location of event).

Section 3.5 examines the characteristics of the distressing event using a principal components analysis (PCA) of the DEQ (Objective One).

Section 3.6 presents the reliability and validity analysis of the event characteristic scales derived from the PCA, including a statistical comparison of the relevance of each scale for the distressing and control event (Objective Two).

Section 3.7 examines the predictive ability of the event characteristic scales in a regression analysis predicting PTSD symptoms (Objective Three).

Section 3.8 tests the cognitive model of PTSD and explores the potential mediation of the relationship between the event characteristic scales and PTSD symptoms by the cognitive variables of peritraumatic dissociation and posttrauma cognitions (Objective Four).
Section 3.9 presents a supplemental analysis of DEQ items that were excluded from the PCA due to statistical criteria.

3.2. General Data Preparation

The measures of PTSD symptom severity (PDS-S), peritraumatic dissociation (PDEQ), posttrauma cognitions (PTCI-A), and symptoms of depression (BDI) were examined for missing data, univariate outliers, and normality. Each of these measures had very few missing data. Twelve participants were missing data on the 29 PDS-S questions (0.94% of all PDS-S data points). One participant was removed from all analyses using the PDS-S due to a large amount of missing data. Three participants were missing one question on the PDEQ (0.16% of all PDEQ data points), eight participants were missing data on the BDI (0.21% of all BDI data points), and one participant was missing data on the PTCI-A (0.04% of all PTCI-A data points). Given this limited amount of missing data, the missing value for each question was replaced with the mean score, rounded to the nearest value available on the scale.

The PDS-S, PDEQ, and BDI all had significantly skewed distributions, and the PDS-S and PDEQ also had significant kurtosis (p < .001). A square root transformation was applied to the PDS-S and BDI, and a log transformation to the PDEQ in order to improve the distributions of each measure. Four univariate outliers (i.e., more than three standard deviations above the mean) were detected on the PDS-S, but were no longer aberrant after the transformation and therefore retained. The PDEQ distribution had two univariate outliers that were within acceptable limits after the transformation. The BDI had four univariate outliers. The

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1 Data points were calculated for each scale using the total number of questions for the scale, multiplied by the total sample size (n=181).

2 Significant skew and kurtosis was determined by dividing the skew/kurtosis value by the standard error of the value to provide a z score with a critical value = 3.29 (Tabachnick & Fidell, 2001).
transformation reduced the influence of all but one outlier to less than three standard deviations above the mean. The remaining outlier was removed from analyses with the BDI. The PTCI-A was not significantly skewed or kurtotic and had no univariate outliers.

3.3 PDS Sample Description

Overall, the sample fell in the mild range of PTSD symptoms ($M = 6.43$, $SD = 7.02$, range: 0-33). 60.8% ($n = 110$) of participants were classified as experiencing PTSD symptoms in the mild range, 15.5% ($n = 28$) in the moderate range, and 6.1% ($n = 11$) in the moderate-severe range. Of the 147 participants who fell in or above the mild range, and indicated a duration for their PTSD symptoms, 42.2% ($n = 62$) reported experiencing their symptoms for 6 months or less, 8.8% ($n = 13$) for 6-12 months, 23.8% ($n = 35$) for 1-4 years, 7.5% ($n = 11$) for 4-6 years, and 17.7% ($n = 26$) for more than 6 years. 16.1% of participants reported a moderate or greater degree of interference of their symptoms in at least one area of their life.

3.4 Event Comparisons

3.4.1 Analytic Overview

The purpose of this series of analyses was to determine if the distressing and control events differed on Criterion A1 categories and Criterion A2 emotions. The 14 PDS categories were used to determine the frequency with which each category was endorsed for the distressing and control event. 28 participants chose more than one event category for the distressing event, and 23 participants chose multiple categories for the control event. For example, if a participant attended a car accident with multiple victims, they may have selected Death of an Adult and Severely Injured Child. To address this multiple endorsement, the relative frequency of the selected event categories were calculated using the corresponding total number of category endorsements for the distressing (231 endorsements) and control events (213 endorsements).
Furthermore, comparisons were conducted on the two PDS questions assessing Criterion A1 (i.e., degree of threat to self and others). The two events were also compared by analyzing the three PDS questions assessing Criterion A2 (i.e., helpless, horrified and terrified).

All statistical comparisons utilized repeated-measures $t$-tests that assume a normal distribution of the difference scores. The distribution of the difference scores for the five PDS questions assessing the degree of Criterion A were not significantly skewed, and only one question (threat to others) had significant kurtosis. Therefore, no transformations were performed. No outliers were detected. Finally, because these analyses were performed on single-item questions, missing data were not replaced and pairwise deletion was used.

### 3.4.2 Event Descriptions

The following examples illustrate the events the participants selected. Overall, the event descriptions suggest that participants were selecting serious Criterion A1 events for both the distressing and control events. The following examples are from the Death of an Adult category:

“T-bone accident where a 4 door sedan pulled in front of a transport truck. The driver of the car’s head exploded on impact.” (Distressing Event)

“Saw a male shoot himself in the head.” (Distressing Event)

“Single MVA, man thrown from vehicle and found all contorted.” (Control Event)

“Fatal vehicle crash where the vehicle was fully engulfed in flames. bodies lying in the middle of road.” (Control Event)

A description of the Horrific Injuries category for both the distressing and control event demonstrate the complexity of the situations faced by the participants:

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3 Some examples were modified slightly to maintain participant anonymity.
“Quintuple fatal car crash, multiple youth killed/burned alive. Adults in another vehicle.” (Distressing Event)

“Youth in a single vehicle accident, busted up badly and I had to inflict so much pain to the victim to get him out.” (Control Event)

Finally, examples from events involving children demonstrate the particularly difficult nature of first response work, for both events considered as distressing, and control events:

“Pick up and semi head on. Older male, younger female and baby all died. Female and baby dismembered.” (Distressing Event)

“I was called to a child that had been hit in the head and was laying on the ground shaking and severely bleeding from the head.” (Control Event)

3.4.3 PDS Criterion A1 Analyses

Tables 2 and 3 present the event categories, ranked by frequency of endorsement, for the distressing and control events, respectively. Three of the top four categories for each type of event were the same. For both events, Death of an Adult was the most frequently endorsed category. Other shared categories in the top four included Person with Horrific Injuries (distressing event: rank 3; control event: rank 2), and Handling Dead Body or Parts (distressing event: rank 4; control event: rank 3). Unique to the top four for the distressing event was Death of a Child, the second most frequent category. For the control event, Suicide or Suicide Attempt (rank 4) was unique in the top four, although it had almost the same overall percentage of endorsement for the distressing event (rank 7).
Table 2  Frequency of PDS Event Categories for the Distressing Event

<table>
<thead>
<tr>
<th>Event</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of an adult</td>
<td>19.9</td>
</tr>
<tr>
<td>Death of a child</td>
<td>17.3</td>
</tr>
<tr>
<td>Person with horrific injuries</td>
<td>12.6</td>
</tr>
<tr>
<td>Handling dead body/parts</td>
<td>12.1</td>
</tr>
<tr>
<td>Serious threat of injury/death to oneself</td>
<td>8.2</td>
</tr>
<tr>
<td>Other</td>
<td>7.8</td>
</tr>
<tr>
<td>Suicide or suicide attempt</td>
<td>6.5</td>
</tr>
<tr>
<td>Severely injured child</td>
<td>5.6</td>
</tr>
<tr>
<td>Violence against self</td>
<td>3.9</td>
</tr>
<tr>
<td>Significant injury to self</td>
<td>1.7</td>
</tr>
<tr>
<td>Witnessing death/injury to another first responder</td>
<td>1.3</td>
</tr>
<tr>
<td>Violence against co-worker</td>
<td>1.3</td>
</tr>
<tr>
<td>A fire where victim was in danger</td>
<td>1.3</td>
</tr>
<tr>
<td>Causing harm while providing services</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Note. Percentage is calculate using 231 event category endorsements. PDS = Posttraumatic Stress Diagnostic Scale.

Table 3  Frequency of PDS Event Categories for the Control Event

<table>
<thead>
<tr>
<th>Event</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of an adult</td>
<td>35.7</td>
</tr>
<tr>
<td>Person with horrific injuries</td>
<td>18.8</td>
</tr>
<tr>
<td>Handling dead body/parts</td>
<td>17.4</td>
</tr>
<tr>
<td>Suicide or suicide attempt</td>
<td>6.1</td>
</tr>
<tr>
<td>Other</td>
<td>6.1</td>
</tr>
<tr>
<td>Death of a child</td>
<td>3.8</td>
</tr>
<tr>
<td>Serious threat of injury/death to oneself</td>
<td>3.8</td>
</tr>
<tr>
<td>Violence against self</td>
<td>2.8</td>
</tr>
<tr>
<td>Severely injured child</td>
<td>1.9</td>
</tr>
<tr>
<td>Violence against co-worker</td>
<td>1.4</td>
</tr>
<tr>
<td>A fire where victim was in danger</td>
<td>1.4</td>
</tr>
<tr>
<td>Witnessing death/injury to another first responder</td>
<td>0.9</td>
</tr>
<tr>
<td>Significant injury to self</td>
<td>0</td>
</tr>
<tr>
<td>Causing harm while providing services</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. Percentage is calculate using 213 event category endorsements. PDS = Posttraumatic Stress Diagnostic Scale.
Table 4 presents sample means and standard deviations on the two PDS Criterion A1 questions. Repeated-measures \( t \)-tests indicated that for the distressing event, participants indicated significantly higher levels of threat of injury or death to themselves \( t (175) = 2.74, p = .007, r = .20 \). There was no significant difference between the events in degree of threat of death or injury to another person, \( t (179) = .19, p = .851, r = .01 \).

### Table 4 Mean Scores and Standard Deviations on the PDS Criterion A Questions

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Distressing Event</th>
<th>Control Event</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Helpless</td>
<td>1.39 (1.08)(^a)</td>
<td>.59 (.78)</td>
<td>177</td>
</tr>
<tr>
<td>Terrified</td>
<td>.70 (.96)(^a)</td>
<td>.29 (.62)</td>
<td>174</td>
</tr>
<tr>
<td>Horrified</td>
<td>1.16 (1.10)(^a)</td>
<td>.33 (.60)</td>
<td>171</td>
</tr>
<tr>
<td>Possible death/injury to self</td>
<td>.61 (1.09)(^a)</td>
<td>.34 (.80)</td>
<td>176</td>
</tr>
<tr>
<td>Possible death/injury to other</td>
<td>2.18 (1.21)</td>
<td>2.16 (1.26)</td>
<td>180</td>
</tr>
</tbody>
</table>

*Note.* The sample size is different for each comparison due to missing data. PDS=Posttraumatic Stress Diagnostic Scale.
\(^a\) Events significantly different, \( p < .05 \).

#### 3.4.4 PDS Criterion A2 Analyses

Participants were classified as meeting Criterion A2 if they endorsed (i.e., score of 2 or above) at least one of the three emotional reaction questions from the PDS (i.e., helpless, horrified, or terrified). Overall, 112 (62.2%) participants met Criterion A2 for the distressing event, and 35 (19.5%) participants met Criterion A2 for the control event. Table 4 presents group means and standard deviations on the three PDS Criterion A2 questions. Repeated-\( t \)-tests indicated that participants reported significantly higher levels of all three Criterion A2 emotions for the distressing event than the control event: helpless, \( t (176) = 10.01, p < .001, r = .11 \); terrified, \( t (173) = 5.37, p < .001, r = .38 \), and; horrified \( t (170) = 9.78, p < .001, r = .60 \).
3.4.5 Other Event Descriptors

The frequency of the locations where the events occurred are presented in Table 5. An inspection of these frequencies suggests that the proportion of events that occurred in each area was largely the same for the distressing and control events. Overall, the majority of events occurred in rural settings (isolated or non-isolated) for both the distressing (50.3%) and control events (51.9%).

Table 5  Frequencies of the Location of the Event Types

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Distressing Event (%)</th>
<th>Control Event (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated rural</td>
<td>49 (27.1)</td>
<td>50 (27.6)</td>
</tr>
<tr>
<td>Non-isolated rural</td>
<td>42 (23.2)</td>
<td>44 (24.3)</td>
</tr>
<tr>
<td>Small-town</td>
<td>69 (38.1)</td>
<td>71 (39.2)</td>
</tr>
<tr>
<td>Urban</td>
<td>19 (10.5)</td>
<td>16 (8.8)</td>
</tr>
</tbody>
</table>

Finally, participants were classified as having sustained an injury if they scored above 2 (i.e., mild injury) on the Likert-type scale. Overall, very few participants indicated being injured during the distressing event (n = 13, 7.2%) and control event (n = 6, 3.3%). Given this low endorsement, no further analyses were conducted on the injury data.

3.5 Principal Component Analysis of the Description of Event Questionnaire

3.5.1 Analytic Overview

The analyses in this section involved the DEQ questions describing the characteristics of the distressing event (i.e., DEQ-DIS). The DEQ was an exploratory measure that included a liberal number of questions (n = 35) exploring a broad range of characteristics of the target event. The goal was to reduce the DEQ into a useful number of components that best summarized many of the event characteristics suggested as important in the literature. Toward
this goal, Principal Component Analysis (PCA) was chosen because it extracts the maximum variance and provides an empirical summary of a dataset, making it the primary choice when reducing a large number of items down to smaller number of components (Tabachnick & Fidell, 2001). Prior to conducting the PCA, an item reduction was performed based mainly on improving the factorability of the DEQ items by eliminating those with low sampling adequacy.

3.5.2 Data Preparation and Initial Item Reduction

15 participants were missing data on the DEQ items for the distressing event (0.64% of all data points). Given this small amount of total missing data, each point was replaced with the mean value, rounded to nearest whole number, for each question. To increase the utility of the DEQ in identifying event characteristics that were more characteristic of the distressing event, compared to the control event, an initial item reduction was performed by eliminating DEQ items that demonstrated limited descriptiveness of the distressing event (i.e., endorsement of 2 or less for at least 80% of participants) or had conceptual overlap with other questions. Eight items met this criterion and were excluded from further analysis.

3.5.3 Preliminary Analysis

The remaining 27 DEQ items were assessed for PCA suitability. Multivariate normality was assessed indirectly by examining the skew and kurtosis of each item. Most items had significant skew and/or kurtosis. Given the relaxation of distributional assumptions in PCA (Tabachnick & Fidell, 2001), the analysis was performed on the untransformed distributions. Linearity was assessed by the examination of bivariate scatterplots. Due to the large number of scatterplots, only a subset of 39 scatterplots were screened that were suspected of having the potential to deviate from linearity. Some distributions demonstrated deviations. Therefore, all analyses were repeated using a log transformation of all of the DEQ items in order to assess the
impact of these deviations. The results of these analyses are reported in footnotes. Notably, the final results of the log transformed data were the same as the untransformed data.

Outliers were identified using an iterative approach by examining the data for new outliers after the removal of previously identified outliers. Univariate outliers (i.e., more than three standard deviations above the mean) were identified for each DEQ item. One item had three univariate outliers. Univariate outliers were not deleted unless they were also multivariate outliers. Multivariate outliers were identified for each unique set of DEQ items analyzed in both the item reduction and PCA analyses. Multivariate outliers were identified using Mahalanobis distance with a critical value of $p < .001$. Cases were removed only from the analysis of each set of items for which they were identified as being a multivariate outlier. The multivariate outliers are reported separately for each analysis.

Next, the factorability of the correlation matrix was assessed and improved through item reduction. In an iterative process, items with Kaiser’s measure of sampling adequacy (MSA) values below the recommended minimum of .60 (Tabachnick & Fidell, 2001) were deleted, and the MSA values recalculated on the remaining items. This process was performed twice until all DEQ item values were above .60$^4$. Overall, eight items were eliminated, leaving 19 items with an acceptable MSA value$^5,6$. Further supporting the factorability of the remaining 19 DEQ items was an acceptable Kaiser-Meyer-Oklin (KMO) value (.84), and significant value for Bartlett’s test of sphericity, $\chi^2 (171) = 1096.11, p < .001$. Additionally, none of the bivariate correlations

$^4$ One multivariate outlier was identified for the second analysis.

$^5$ The same multivariate outlier from the second iteration of the MSA analysis was identified on these 19 items and removed from all analyses.

$^6$ With the transformed data, no multivariate outliers were identified. Seven items had a MSA below .60, all of which were the same as those identified using the untransformed data. Overall, only one question remained in the analysis that was not included with the untransformed data. The first factor accounted for 21.9% of the total variance, and the second factor accounted for 16.6% of the total variance.
exceeded .90 and the determinant of the correlation matrix was within acceptable levels (.002) suggesting the absence of multicollinearity and potential singularity.

3.5.4 Principal Component Analysis

First, the number of components to extract was determined by subjecting the 19 DEQ items to a PCA with an extraction criterion of an eigenvalue greater than 1. Five factors had an eigenvalue over one; however, the scree plot suggested an extraction of two or four components. Next, a series of Varimax rotations with Kaiser Normalizations were conducted to examine the component structure when extracting five, four, and two components. Only component loadings above .50 were interpreted. The five and four component solutions each had one component with only two or three items that loaded above .50, which limited their interpretation. Therefore, the two-component solution was retained. The rotated two-component solution accounted for 39.27% of the variance, and 14 of the items loaded above .50 on one of the two components.

Table 6 contains the component loadings. The first component had eight items that reflected the theme of Chaos, and accounted for 29.56% of the total variance of the rotated solution. The second component had six items and reflected the theme of Resource Limitations. This component accounted for 9.72% of the total variance.\(^7\)

\(^7\) Using the transformed data, the screeplot was almost identical and the pattern of factor loadings was exactly the same. Notably, the extra question that was included did not load above .50 on either of the two factors.
Table 6  Principal Components Analysis Loadings with Varimax Rotation of the DEQ-DIS

<table>
<thead>
<tr>
<th>DEQ-DIS Item</th>
<th>Chaos</th>
<th>Resource Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scene seemed chaotic</td>
<td>.81</td>
<td>.10</td>
</tr>
<tr>
<td>Events happened too quickly</td>
<td>.78</td>
<td>.16</td>
</tr>
<tr>
<td>Things kept going wrong</td>
<td>.71</td>
<td>.06</td>
</tr>
<tr>
<td>Unanticipated things happened</td>
<td>.67</td>
<td>.17</td>
</tr>
<tr>
<td>So much going on we did not know where to start</td>
<td>.62</td>
<td>.17</td>
</tr>
<tr>
<td>Situation was worse than expected</td>
<td>.58</td>
<td>.06</td>
</tr>
<tr>
<td>Lack of adequate supervision</td>
<td>.53</td>
<td>.19</td>
</tr>
<tr>
<td>Normal procedures not working</td>
<td>.50</td>
<td>.17</td>
</tr>
<tr>
<td>Far away from back-up</td>
<td>.00</td>
<td>.70</td>
</tr>
<tr>
<td>Had to wait a long time for help</td>
<td>.18</td>
<td>.65</td>
</tr>
<tr>
<td>I was in charge</td>
<td>-.02</td>
<td>.65</td>
</tr>
<tr>
<td>Inadequate resources</td>
<td>.38</td>
<td>.58</td>
</tr>
<tr>
<td>Harsh physical conditions</td>
<td>.13</td>
<td>.58</td>
</tr>
<tr>
<td>Too much to do not enough hands</td>
<td>.43</td>
<td>.56</td>
</tr>
<tr>
<td>Multiple situations/victims requiring attention</td>
<td>.30</td>
<td>.31</td>
</tr>
<tr>
<td>At the scene for unusual (prolonged) amount of time</td>
<td>.32</td>
<td>.37</td>
</tr>
<tr>
<td>Time pressure to resolve the situation</td>
<td>.43</td>
<td>.22</td>
</tr>
<tr>
<td>It was difficult to get to the scene</td>
<td>.11</td>
<td>.46</td>
</tr>
<tr>
<td>I had to provide services outside my scope of training</td>
<td>.29</td>
<td>.43</td>
</tr>
</tbody>
</table>

*Note.* Component loadings ≥ .50 are in bold face. DEQ-DIS = Description of the Event Questionnaire-Distressing Event.

3.5.5 Supplemental Agency Analysis

The DEQ covariance matrices for each agency were tested for invariance to determine the permissibility of combining the data from all three agencies. On the final set of 19 items, Box’s M was significant at the recommended $p = .001$ level (Tabachnick & Fidell, 2001), indicating the potential for differences in the pattern of covariance between the agencies, $F(380, 35 233.02) = 1.47$. Further exploration indicated that while the covariance matrices of the RCMP and paramedics did not differ from each other $F(190, 16 418.75) = 1.21, p = .029$, the
covariance matrix of firefighters differed significantly from the matrices of both the RCMP, $F(190, 22 125.42) = 1.76, p < .001$ and paramedics $F(190, 18 512.79) = 1.49, p < .001$.

The impact of the potentially different covariance matrices was explored by testing the invariance of the two-component structure by simultaneously fitting the PCA two-component model to the firefighters and the combined data of the RCMP and paramedics. However, the results of this analysis were considered exploratory because of the small number of participants in each group relative to the number of items in the factor analysis. Model fit was considered good with a nonsignificant chi-square value, Root Mean Square Error of Approximation (RMSEA) of .08 or less, and the Comparative Fit index (CFI) at .90 or above (Kline, 2005).

The fit indices from the maximum likelihood factor analysis indicated only marginal support for the model, $\chi^2 (152) = 278.33, p < .001$; CFI = .84, and; RMSEA = .069. All items loaded significantly on the specified factors for the combined RCMP/paramedic group; however, two items failed to reach statistical significance for the firefighters: one item on the Chaos factor (i.e., There was lack of adequate supervision on the scene), and one on the Resource Limitations factor (i.e., I didn’t have adequate resources to work with). Removing these two items from the analysis improved model fit. Although the chi square value remained significant $\chi^2 (156) = 175.68, p < .001$, the CFI was just below the acceptable cutoff (.88), and the RMSEA value was within acceptable levels (.061), with the highest value of the 90% confidence interval within the acceptable range (.044 -.077).

### 3.6 DEQ-DIS Scales: Reliability and Validity Analyses

#### 3.6.1 Analytic Overview

The next step was to determine if the Chaos and Resource Limitations components derived from the PCA had utility in understanding the distressing event. To conduct these
analyses, event characteristic scales were created by summing the items that loaded on each component, for a total score on each scale. A Chaos and Resource Limitations scale was created for both the distressing and control event. These analyses then examined the psychometric properties (i.e., internal consistency) and construct validity of the event characteristic scales.

3.6.2 Data Preparation

21 participants were missing data on the DEQ questions for the control event (0.35% of all data points). Given this small amount of total missing data, each point was replaced with the mean value, rounded to nearest whole number, for each question. The Chaos and Resource Limitations scales for the control event were significantly skewed. However, the distribution of the difference scores for the distressing event and the control event for each scale were normally distributed so the repeated-measures analyses were conducted on the untransformed data. The Resource Limitations scale for the distressing event was slightly over the critical value for significant skew ($z = 3.33$). Given the interest in comparing the Chaos and Resource Limitations scales on their association with various PTSD constructs, the original metric for both scales was retained. One univariate outlier was identified on the Chaos scale for the control event and was removed from analyses using this scale.

3.6.3 Scale Reliability

The Chaos scale had good internal consistency for both the distressing ($\alpha = .82$) and control event ($\alpha = .80$). The Resource Limitations scale had acceptable internal consistency for both the distressing ($\alpha = .74$) and control event ($\alpha = .70$).

3.6.4 Event Comparisons

Table 7 presents the means and standard deviations for the event characteristic scales. Repeated-measures $t$-tests indicated that participants scored higher on both of the scales for the
distressing event compared to the control event: Chaos $t (179) = 6.81, p < .001, r = .45$, and;
Resource Limitations $t (180) = 2.24, p = .027, r = .14$.

Table 7  Means and Standard Deviations of the DEQ Scales for the Event Types

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Distressing Event</th>
<th>Control Event</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaos</td>
<td>23.32 (9.94)$^a$</td>
<td>17.99 (8.83)</td>
<td>180</td>
</tr>
<tr>
<td>Resource Limitations</td>
<td>17.50 (8.39)$^a$</td>
<td>15.91 (7.88)</td>
<td>181</td>
</tr>
</tbody>
</table>

*Note. DEQ = Description of the Event Questionnaire.
$^a$ Events significantly different, $p < .05$.

3.6.5 Construct Validity: DEQ-DIS Scale Correlations

Table 8 displays the Pearson correlations between the event characteristic scales for the distressing event and PTSD symptoms (PDS-S), peritraumatic dissociation (PDEQ), and posttrauma cognitions (PTCI-A). Both event characteristic scales demonstrated positive and significant correlations with the other measures. The Chaos scale had a large correlation with peritraumatic dissociation and moderate correlations with PTSD symptoms and posttrauma cognitions. The Resource Limitations scale had moderate correlations with all measures. Overall, having greater levels of chaos and resource limitations at the time of the distressing event was associated with greater dissociation during the event, negative posttrauma cognitions, and PTSD symptoms.
Table 8  Correlations Between the DEQ-DIS Scales, PTSD Symptoms, and Cognitive Variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>PDS-S&lt;sup&gt;a&lt;/sup&gt; (n = 180)</th>
<th>PDEQ&lt;sup&gt;b&lt;/sup&gt; (n = 181)</th>
<th>PTCI-A (n = 181)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaos</td>
<td>.43**</td>
<td>.54**</td>
<td>.43**</td>
</tr>
<tr>
<td>Resource Limitations</td>
<td>.33**</td>
<td>.28**</td>
<td>.24**</td>
</tr>
</tbody>
</table>

Note. DEQ = Description of the Event Questionnaire-Distressing Event; PDS-S = Posttraumatic Stress Diagnostic Scale-Symptom Severity; PDEQ = Peritraumatic Dissociation Experiences Questionnaire; PTCI-A: Posttraumatic Cognitions Inventory-Abbreviated.
<sup>a</sup>Square-root transformed. <sup>b</sup>Log transformed.
** p < .01.

3.6.6 Construct Validity: Supplemental Clinical Sample Analysis

The sample was divided in to two groups: participants (n = 18, 9.94%) who met the criteria of likely experiencing a clinical level of PTSD symptoms (i.e., 18 or above on the PDS-S), and those who fell below the criteria (n = 162, 89.5%). Table 9 presents the means and standard deviations for these two groups on the event characteristic scales for the distressing event. The Resource Limitations scale was significantly skewed in the nonclinical group, so a square root transformation was applied to the Resource Limitations scale for both groups. No outliers were identified. Independent samples t-tests indicated that the clinical sample scored significantly higher on both scales: Chaos $t(178) = 4.92, p < .01, r = .35$, and Resource Limitations $t(178) = 2.73, p = .007, r = .20$.

Table 9  Means and Standard Deviations of the DEQ-DIS Scales for the Clinical and Non-Clinical Groups

<table>
<thead>
<tr>
<th>Scale</th>
<th>Clinical Level</th>
<th>Below Clinical Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaos</td>
<td>33.94 (8.26)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>22.29 (9.61)</td>
</tr>
<tr>
<td>Resources Limitations&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.66 (.93)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.00 (.98)</td>
</tr>
</tbody>
</table>

Note. n = 180. DEQ-DIS = Description of the Event Questionnaire-Distressing Event.
<sup>a</sup>Square-root transformed. <sup>b</sup>Groups significantly different, $p < .01$.  

3.7 Predictive Validity of DEQ-DIS Scales

3.7.1 Analytic Overview

Hierarchical multiple regression was used to determine if the Chaos and Resource Limitation scales for the distressing event predicted PTSD symptoms (PDS-S) above meeting Criterion A. This analysis also addressed two other supplemental questions: 1) do the Chaos and Resource Limitations scales account for significant variance in PTSD symptoms when covariates are controlled, and 2) what is the relative contribution of each event characteristic scale in predicting PTSD symptoms, after controlling for covariates. To address these questions, variables were entered in three sets. In step one, the covariates were entered which included gender, age, highest number of years reported as a first responder, education dichotomized as high school (0=completed or less) and secondary education (1 = completed or less), relationship status dichotomized as single (code = 0) or in a relationship (code = 1; married, common law, steady relationship), and symptoms of depression (BDI). Additionally, two variables dummy coded to control for any effect of agency were also included. In step two, meeting Criterion A was entered. Since participants needed to choose a Criterion A1 event to be included in the study, participants were defined as meeting Criterion A if they endorsed (i.e., score of 2 or above; 0 = no and 1 = yes) at least one of the three PDS Criterion A2 emotion questions (i.e., helplessness, terrified, or horrified). 112 participants met Criterion A (62.2%). In step three, the Chaos and Resource Limitations scales were entered.

3.7.2 Data Preparation

Inspection of the residual scatterplots indicated violations of normality and homoscedasticity, but no deviations from linearity. Using the transformed versions of the variables with the largest skew [i.e., PDS-S (square root), BDI (log), and highest number of years
indicated as a first responder (square root)] improved normality, and greatly reduced heteroscedasticity. The results reflect the use of these transformed variables. No influential cases were identified using measures of leverage, distance, and influence. The combination of the listwise deletion of missing data on the covariates, the exclusion of the BDI outlier, and the exclusion of one participant with substantial missing data on the PDS-S, resulted in 172 participants included in the analysis. Table 10 presents the correlations among the regression model variables. The Chaos and Resource Limitations scales were moderately correlated, although not at a level typically of concern for multicollinearity. Further investigation of these variables indicated acceptable tolerance levels (.49-.95), VIF values (1.05 to 2.02), and condition values (i.e., no dimension with a condition index above 30 combined with two variances above .50).

---

8 Although the Chaos and Resource Limitations scales were also skewed, using the transformed versions of these scales did not improve the heteroscedasticity. Therefore, given the interest in comparing the relative contribution of these variables to the prediction of PTSD symptoms, the untransformed variables were used so that both scales used the same metric.
Table 10  Correlations Between PTSD Symptoms, Covariates, Criterion A, and DEQ-DIS Scales

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PDS-S&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Gender</td>
<td>.17&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Age</td>
<td>.03</td>
<td>-.05</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Education</td>
<td>.02</td>
<td>.04</td>
<td>-.12</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Relationship</td>
<td>-.06</td>
<td>-.06</td>
<td>.25&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-.08</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Highest years&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.09</td>
<td>-.07</td>
<td>.65&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-.12</td>
<td>.23&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Agency 1</td>
<td>-.01</td>
<td>-.14</td>
<td>-.33&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.11</td>
<td>-.03</td>
<td>-.22&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Agency 2</td>
<td>.18&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.28&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.29&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.05</td>
<td>-.03</td>
<td>.19&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-.59&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. BDI&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.46&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.09</td>
<td>-.01</td>
<td>.08</td>
<td>.04</td>
<td>.07</td>
<td>.21&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.07</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>10. Criterion A</td>
<td>.10</td>
<td>.00</td>
<td>.22&lt;sup&gt;**&lt;/sup&gt;</td>
<td>-.06</td>
<td>.01</td>
<td>.10</td>
<td>-.10</td>
<td>.11</td>
<td>.05</td>
<td>-</td>
</tr>
<tr>
<td>11. Chaos</td>
<td>.41&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.07</td>
<td>.02</td>
<td>.05</td>
<td>.02</td>
<td>.19&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.04</td>
<td>.05</td>
<td>.27&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.21&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>12. Resources</td>
<td>.33&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.07</td>
<td>.15&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.10</td>
<td>.11</td>
<td>.31&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.15&lt;sup&gt;*&lt;/sup&gt;</td>
<td>.05</td>
<td>.23&lt;sup&gt;**&lt;/sup&gt;</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note: n = 172. DEQ-DIS = Description of the Event Questionnaire-Distressing Event; PDS-S = Posttraumatic Stress Diagnostic Scale-Symptom Severity; Gender: male (coded 0) and female (coded 1); Education: high school complete or less (coded 0) and secondary education (coded 1); Relationship: single (coded 0) or in a relationship (coded 1); Highest years: highest number of years reported as a first responder; BDI = Beck Depression Inventory-II; Resources = Resource Limitations.

<sup>a</sup>Square-root transformed. <sup>b</sup>Log transformed.

* p < .05. ** p < .01
3.7.3 Hierarchical Multiple Regression

The results of the regression analysis are presented in Table 11. The covariates in step one accounted for a significant proportion of variance (25.3%) in PTSD symptoms, $F_{\Delta} (8, 163) = 6.9, p < .001$. However, symptoms of depression was the only significant predictor among this set of variables. Adding the Criterion A variable in step 2 did not account for any significant additional variance in PTSD symptoms, $F_{\Delta} (1,162) = .896, p = .345$. Adding the Chaos and Resource Limitations scales in step three accounted for an additional 9.6% of variance in PTSD symptoms, $F_{\Delta} (2,160) = 11.87, p < .001$. Both the Chaos and Resource Limitations scales were significant predictors of PTSD symptoms, and Chaos was the strongest predictor ($b^* = .27$) of the two scales. Overall, the regression model accounted for 36% of the variance in PTSD symptoms.
Table 11  Hierarchical Multiple Regression Predicting PDS-S from Covariates, Criterion A, and DEQ-DIS Scales

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$R^2$ (Adj. $R^2$)</th>
<th>$\Delta R^2$</th>
<th>$^*b$</th>
<th>$b$</th>
<th>SEb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.09</td>
<td>.30</td>
<td>.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.02</td>
<td>.00</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>-.02</td>
<td>-.08</td>
<td>.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship</td>
<td>-.08</td>
<td>-.33</td>
<td>.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest years(^a)</td>
<td>.09</td>
<td>.07</td>
<td>.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agency 1</td>
<td>-.07</td>
<td>-.08</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agency 2</td>
<td>.10</td>
<td>.34</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI(^b)</td>
<td>.45***</td>
<td>1.3</td>
<td>.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.257** (.216)</td>
<td>.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criterion A</td>
<td>.07</td>
<td>.19</td>
<td>.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>.353** (.309)</td>
<td>.096**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaos</td>
<td>.24**</td>
<td>.03</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Limitations</td>
<td>.17*</td>
<td>.03</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $n = 172$. DEQ-DIS = Description of the Event Questionnaire-Distressing Event; PDS-S = Posttraumatic Stress Diagnostic-Symptom Severity (square-root transformed); Gender: male (coded 0) and female (coded 1); Education: high school complete or less (coded 0) and secondary education (coded 1); Relationship: single (coded 0) or in a relationship (coded 1); Highest years: highest number of years reported as a first responder; BDI = Beck Depression Inventory-II.

\(^a\) Square-root transformed. \(^b\) Log transformed.

* $p < .05$. ** $p < .01$. \(p < .001\)

3.8 Structural Equation Modeling: Testing the Cognitive Model

3.8.1 Analytic Overview

Structural equation modeling (SEM) was used to test the predicted pathways of the cognitive model between event characteristics (Chaos and Resource Limitations), peritraumatic dissociation (PDEQ), posttrauma beliefs (PTCI-A), and PTSD symptoms (PDS-S). The model was developed using AMOS 18 (Arbuckle, 2009) and utilizing Maximum Likelihood to calculate the model estimates. First, the structural model in Figure 2 was tested.
To simplify the model and subsequent mediation analyses, the Chaos and Resource Limitations scales for the distressing event were combined into a single factor (i.e., Event) using confirmatory factor analysis. Paths were included from the Event to posttrauma cognitions, peritraumatic dissociation and PTSD symptoms. Furthermore, paths were included to PTSD symptoms from posttrauma cognitions and peritraumatic dissociation. To test the total indirect effect of the Event on PTSD symptoms through posttrauma cognitions and peritraumatic dissociation, the standard error was estimated using bootstrapping (500 re-samples). However, AMOS 18 does not provide the decomposition of this total indirect effect through the two separate pathways (i.e., Event through peritraumatic dissociation, and Event through posttrauma cognitions).
cognitions). Therefore, Sobel’s test was conducted to test the indirect (meditational effect) of these separate meditational pathways. Model fit was assessed using the same criteria reviewed earlier for the chi-square value, RMSEA, and CFI.

### 3.8.2 Data Preparation

The main assumptions underlying SEM are multivariate normality, linearity, and the absence of multicollinearity and singularity. Multivariate normality was indirectly assessed by examining the univariate distributions of each variable. As previously described (see Section 3.2), the PDS-S and PDEQ were significantly skewed and were transformed to improved normality; a square-root transformations was applied to the PDS-S, and a log transformation was applied to the PDEQ. The examination of scatterplots indicated no evidence of nonlinearity. None of the correlations exceeded .90 suggesting the absence of multicollinearity. Finally, no outliers were identified.

### 3.8.3 Structural Model

Prior to testing the structural model, the variables were allowed to correlate to ensure a positive relationship between the latent Event factor and the other variables. Table 12 presents the correlations. The Event was significantly correlated with all other variables.
Table 12  Correlations Between Variables in the Structural Equation Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PDS-S⁴</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Event</td>
<td>.52**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PDEQ⁵</td>
<td>.48**</td>
<td>.62**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. PTCI-A</td>
<td>.49**</td>
<td>.50**</td>
<td>.38**</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. n = 180. PDS-S = Posttraumatic Stress Diagnostic Scale-Symptom Severity; PDEQ = Peritraumatic Dissociation Experiences Questionnaire; PTCI-A= Posttraumatic Cognitions Inventory-Abbreviated.

⁴ Square-root transformed. ⁵ Log transformed.

** p < .001

The proposed model provided a good fit to the data: $\chi^2 (3) = 3.36, p = .339$; CFI=.998, and; RMSEA =.026, CI(90) = .000-.131. All factor loadings for the Event factor were significant and moderate to large in magnitude, supporting the one-factor model: Chaos (.82), and Resource Limitations (.52). Figure 2 presents the path coefficients. As predicted, the Event was significantly related to peritraumatic dissociation and posttrauma cognitions, which in turn were both positively related to PTSD symptoms. The pathway between the Event and PTSD symptoms was also significant. Overall, the model accounted for 37.2% of the variance in PTSD symptoms. In summary, events that were more highly characterized by chaos and resource limitations were associated with greater dissociation during the trauma, and more vulnerable posttrauma cognitions. In turn, higher levels of all three of these variables were related to more severe PTSD symptoms.
3.8.4 Indirect Effects

The Event factor had a significant total indirect effect on PTSD symptoms \( (b^* = .27, z = 4.62, p < .001) \) through both posttrauma cognitions and peritraumatic dissociation. To discern the individual contributions of those mediators to the indirect effect, each mediating pathway was tested separately using the Sobel test on the unstandardized regression coefficients. The first meditational model consisted of the Event to peritraumatic dissociation (pathway a), and peritraumatic dissociation to PTSD symptoms (pathway b). The second meditational model consisted of the Event to posttrauma cognitions (pathway a), and posttrauma cognitions to PTSD symptoms (pathway b). Table 13 presents the unstandardized values and Sobel tests. Each model
had a significant indirect effect. Overall, the decomposition of the standardized total indirect effect into the contributions of the two standardized indirect effects indicates that each path contributed approximately to the same degree, peritraumatic dissociation; $b^* = .13$; posttrauma cognitions: $b^* = .14$.

### Table 13 Sobel Tests of the Mediators for the Event and PTSD Symptom Pathways

<table>
<thead>
<tr>
<th>Mediator</th>
<th>$a (SE_a)$</th>
<th>$b (SE_b)$</th>
<th>ab ($SE_{ab}$)</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDEQ$^a$</td>
<td>.013 (.002)</td>
<td>1.679 (.81)</td>
<td>.02 (.011)</td>
<td>1.98*</td>
</tr>
<tr>
<td>PTCI-A</td>
<td>.737 (.126)</td>
<td>.033 (.01)</td>
<td>.02 (.008)</td>
<td>2.87*</td>
</tr>
</tbody>
</table>

*Note: PDEQ = Peritraumatic Dissociation Experiences Questionnaire; PTCI-A = Posttraumatic Cognitions Inventory-Abbreviated.

$^a$ Log transformed.

$^* p < .05.$

#### 3.8.5 Supplemental Analysis

Given that the examination of the covariance matrices for the PCA revealed potential agency differences, the path model was tested simultaneously for the three agencies. There was no requirement that the parameters have the same values. The fit indices indicated that the model was a good fit for all three agencies: $\chi^2 (9) = 10.58$, $p = .31$; CFI = .993, and; RMSEA = .032, CI(90) = .00-.09.

#### 3.9 Excluded Item Analysis

A supplementary analysis was conducted to determine if the eight items eliminated from the PCA, due to low factorability, were rated significantly higher for one of the event types. The means and standard deviations are reported in Table 14. Repeated-measures $t$-tests revealed a significant difference ($p < .05$) for three items. Two items were rated significantly higher for the distressing event: The victim reminded me of someone I knew, $t (180) = 5.65$, $p < .001$; and, the
victim’s family/friends or bystanders were on scene and were very upset, \( t(180) = 2.18, p = .031 \). One question was rated higher for the control event: I felt I had control of the situation, \( t(180) = -2.84, p = .005 \). I knew the victim or property owner was marginally significant, \( t(180) = 1.91, p = .057 \).

**Table 14 Means and Standard Deviations of DEQ-DIS Items Excluded from the Principal Components Analysis**

<table>
<thead>
<tr>
<th></th>
<th>Distressing Event</th>
<th>Control Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>My coworkers were supportive and helpful</td>
<td>5.70 (1.86)</td>
<td>5.38 (2.10)</td>
</tr>
<tr>
<td>I felt I had control over the situation</td>
<td>4.24 (1.90)(^a)</td>
<td>4.81 (2.08)</td>
</tr>
<tr>
<td>The victim reminded me of someone I knew</td>
<td>3.25 (2.52)(^a)</td>
<td>2.06 (1.93)</td>
</tr>
<tr>
<td>The victim’s family/friends or bystanders were on scene and were very upset</td>
<td>4.33 (2.62)(^a)</td>
<td>3.75 (2.70)</td>
</tr>
<tr>
<td>I was able to maintain communication with dispatch</td>
<td>4.96 (2.21)</td>
<td>5.22 (2.28)</td>
</tr>
<tr>
<td>I knew the victim or property owner</td>
<td>2.61 (2.38)</td>
<td>2.19 (2.10)</td>
</tr>
<tr>
<td>People were working as a team</td>
<td>5.72 (1.65)</td>
<td>5.88 (1.69)</td>
</tr>
<tr>
<td>The event was malicious/intentional</td>
<td>2.93 (2.57)</td>
<td>2.60 (2.39)</td>
</tr>
</tbody>
</table>

*Note.* DEQ-DIS = Description of the Event Questionnaire-Distressing Event.  
\(^a\)Events significantly different, \( p < .05 \).
4. Discussion

4.1 Summary of Results

This study sampled rural and northern first responders with the overarching purpose of identifying characteristics of Criterion A1 events (i.e., events that presented a threat of serious injury or death) that were associated with lasting symptoms of PTSD. To address this goal, a repeated-measures design was used to compare the characteristics participants perceived as descriptive of Criterion A1 events associated with ongoing distress (i.e., the “distressing” event) to those perceived as descriptive of Criterion A1 events that were not (i.e., the control event).

Overall, the results indicated that the type of Criterion A1 events chosen for the distressing and control events were largely the same, and included the death of an adult, being confronted with a person with horrific injuries, and handling a dead body/parts. Unique to the top four most frequently endorsed categories for distressing events was death of a child and unique to control events was suicide or suicide attempt. Distressing events had significantly higher levels of threat to oneself and of all three DSM-IV Criterion A2 emotional reactions (i.e., terror, helplessness and horror). A principal component analysis of diverse event descriptors beyond Criterion A revealed that distressing events were characterized by the components of Chaos and Resource Limitations, which were both rated as significantly more descriptive for distressing events compared to control events. As hypothesized, both of these characteristics predicted PTSD symptoms above covariates, and simply meeting Criterion A. Consistent with cognitive models, event characteristics influenced peritraumatic dissociation and posttrauma cognitions, which in turn predicted PTSD symptoms. Moreover, the results showed that the effect of the event on PTSD symptoms was partially mediated by these cognitive variables. Overall, the results of this
study are novel in that they indicate it is important to examine event characteristics beyond those of Criterion A.

As the summary suggests, this study design provided information on multiple topics associated with the traumatic stressor and PTSD symptoms, each of which will be discussed in more depth in the following sections: 1) PTSD symptoms in Rural First Responders, 2) Criterion A1 Categories, 3) Criterion A2 Emotions, 4) Event Characteristics, 5) The Prediction of PTSD Symptoms (from event characteristics and covariates), 6) Event Characteristic and the Cognitive Model, 7) Implications for Criterion A, and 8) Possible Professional Differences. Finally, I will end with a discussion on this study’s limitations, strengths and contributions, applications, areas of future research, and conclusions.

4.2 PTSD Symptoms in Rural First Responders

The target population for this study was emergency first responders from the three main emergency professions (i.e., police, volunteer firefighters, and paramedics) located in rural and northern regions of British Columbia. The purpose of focusing on this population was twofold. First, first responders from rural areas are underrepresented in the literature, and limited information is available about levels of PTSD symptoms in this population. Second, including all three professions allowed for the examination of trauma characteristics that would be applicable across the many types of events experienced by first responders, therefore increasing the generalizability of the results. The results indicated that my recruitment efforts were successful in sampling responders from this population in that 90% of participants were from rural and small town areas. The other 10% of participants were from a modest urban area that was still considerably smaller than the geographical sampling area of many large-scale studies on PTSD symptoms in first responder. Moreover, the sample also contained data representative of all three
first response professions, with approximately half the sample from a policing background, and half representing firefighters and paramedics.

Using an empirically supported cutoff for the Posttraumatic Diagnostic Scale (PDS), a well-validated self-report measure of PTSD, 21.6% of the sample fell in the moderate or moderate-severe range of PTSD symptoms, with approximately 50% of participants experiencing their symptoms for at least one year. Overall, 9.94% of this sample fell in a range that is consistent with a clinical level of PTSD symptoms (Ehring et al., 2007). The number of participants with a clinical level of PTSD symptoms is similar to previous studies that have examined work-related PTSD and have assessed all three PTSD symptom clusters. For example, using clinical interviews, 7-8% of police (Carlier et al., 1997; Martin et al., 2009), and 12% of firefighters (Bryant & Guthrie, 2007) met PTSD diagnosis. Notably, the percentage of individuals experiencing PTSD symptoms in the current sample should be interpreted with caution due to the limited information available about the current sample, such as the exact response rate and any potential differences between people who responded to the study and those who did not.

When considering these findings in the broader literature of rural health, it is difficult to determine whether the prevalence rate for this sample should have been substantially different from that of urban samples. For example, in a Canadian sample, the percentage of people reporting mental disorders (such as agoraphobia, major depressive episode, mania, panic disorder, and social phobia) declined with increasing rurality. However, there were no statistically significant differences in prevalence rates between these varying levels of rurality, or between rural areas and metropolitan areas (Canadian Institute for Health Information, 2006). Similarly, combat veterans from rural and urban settings did not differ on the level of self-
reported PTSD symptoms, other mental health problems (e.g., depression), or demographics. Furthermore, veterans from both settings used the same amount of Veteran Affairs (VA) services, even after controlling for the greater time and distance needed to travel to a VA site for the rural sample (Elhai, Baugher, Quevillon, Sauvageot, & Frueh, 2004). In contrast, Cully, Jameson, Phillips, Kunik, and Fortney (2010) found that urban combat veterans had significantly higher rates of new onset PTSD and other mental disorders compared to their rural counterparts. Urban veterans were also more likely to receive adequate exposure to services, even after controlling for travel distance. The authors concluded that additional sociocultural barriers to psychotherapy exist for rural veterans than distance alone, such as cultural acceptability (i.e., perceived degree to which treatment options meet preferences and needs). This is an important consideration as service utilization could affect prevalence rates through access to treatment.

In summary, the overall level of PTSD symptoms found in this sample was largely consistent with the literature on first responders. It is difficult to place this finding in the larger literature because some studies suggest rural environments may not affect the prevalence rates of mental disorders, including PTSD, or that they may offer some protection. The findings on service utilization are also inconsistent, suggesting that rurality may not affect access, or that it may create barriers.

4.3 Criterion A1 Categories

Responding to the death of an adult was the most commonly endorsed category for both the distressing and control event. Most first responders will confront death during their career. For example, 84.9% of paramedics and 93% of firefighters reported lifetime exposure to the death of a patient (Regehr et al., 2002). Furthermore, 29% of ambulance personnel reported attending a suicide/parasuicide in the previous 6 months (Alexander & Klein, 2001). Despite the
ubiquitous exposure to death, it seems unlikely that the frequency of exposure alone would account for the percentage of participants who endorsed this category. First responder experience many other types of critical events, many of which occur at a higher base rate than being confronted with death. Weiss et al. (2010) found that over the course of police officers’ careers, 23.3% dealt with a critical incident involving a badly beaten adult more than 50 times, 29.6% had been confronted with a sexually assaulted adult 10-20 times, and 20.9% had been confronted with a badly beaten child 10-20 times. In contrast, 87.2% reported seeing someone dying only between 1-9 times, although 23.8% indicated seeing the body of someone recently dead over 51 times.

Confronting death plays a central role in the professional identity of first responders. First, both the organizations and first responders consider death to be one of the most difficult situations faced on the job. Palmer (1983) outlined the many steps organizations and first responders take to prepare for and cope with death, including education/desensitization (e.g., being introduced to death in training), humour (e.g., “black humour”), language alteration (e.g., using dispatch codes and medical terminology), scientific fragmentation (e.g., referring to patients by their injury), and rationalization (e.g., death as a relief from suffering). Second, the ability to face death may be considered as a source of identity, something that sets first responders apart from their civilian counterparts. Henry (1995) asserted that for police in particular, the ability to deal with death also provides status in the subculture. However, the current study suggests that some deaths are more difficult to cope with than others, further underscoring the need to understand the traumatic stressor in greater depth. This study highlighted other components of death that could contribute to lasting trauma symptomology. In
particular, being faced with death in a chaotic environment with sub-optimal resources may make it more distressing and impactful.

The finding that confronting people with horrific injuries or handling body parts was also relatively common for both types of events further highlights the need to examine control events. These types of events are often considered especially distressing for first responders (Brown, Fielding, & Grover, 1999) and disaster workers (Ursano, Fullerton, Kao, & Bhartiya, 1995). This study supports these conclusions; however, even these gruesome events may not cause lasting distress under certain circumstances (e.g., reduced chaos on scene and adequate resources). Thus, it may not solely be the horrific nature of these events that cause lasting distress, but also other characteristics highlighted when a control event is included.

Events with children were commonly endorsed as a distressing event compared to the control event, which is consistent with previous literature. A number of qualitative studies have explored what makes events with children particularly distressing. Among the most commonly mentioned factors is the strong identification that can occur with children (Jonsson & Segesten, 2003). Identification is defined as an appraisal of “It could have been me,” or that it could have been someone else close to the person such as his or her child, spouse or friend. With children, there could also be identification with what the parents are going through. This qualitative work is consistent with the significant difference found in this study between the distressing event and control event on items assessing whether the victim reminded the first responder of someone they knew, whether they knew the victim, and whether the victim’s family/friends or bystanders were on scene and very upset. Regehr et al. (2002) also identified through their interviews with paramedics that the helplessness and innocence of children was an important characteristic that made events with children difficult. These authors developed a model proposing that such victim
characteristics promote an emotional connection (i.e., empathy) during the event, which leads to increased distress symptoms. It is possible that symptoms may arise, in part, because this identification or empathy may interfere with processing the trauma in an organized way.

Threat to coworkers was infrequently endorsed for both types of events. In regards to the distressing event, only 1.3% of participants endorsed witnessing the death/injury to another first responder, and 1.3% witnessing violence against a coworker. Notably, these two event categories were also reported for the control event, 0.9% and 1.4%, respectively. These frequencies appear to be low given the reported distress and significance associated with threats to coworkers (Beaton et al., 1998; Declercq et al., 2011). It is possible that threats against first responders may occur less frequently in rural settings. Additionally, first responders are more likely to work alone in these settings, which may further reduce the base rate of experiencing events where coworkers are threatened or injured.

Finally, the significantly higher degree of threat to oneself during the distressing event, compared to the control event, is consistent with numerous studies that have shown that threat to oneself is considered one of the most distressing events for many first responders (e.g., Alden et al., 2008; McCaslin et al., 2006). This finding also supports the dose-response model of trauma exposure. Notably, injury is often considered as part of this model, however, the small degree of physical injury in this sample made further analyses uninformative. The average degree of threat to other people, largely civilians, did not differ between the events. Overall, the results suggest that the severity of threat to others does not necessarily characterize an event as distressing. Conversely, increased threat to oneself, even if the threat is low, is associated with lasting distress. This could reflect the hypersensitivity to danger and the emphasis on self-protection engrained in first responders from the early stages of their training.
4.4 Criterion A2 Emotions

The distressing event elicited a stronger emotional reaction from participants than did the control event. In other words, this study suggests that PTSD symptoms are less likely to follow when the trauma produces less intense emotional reactions. The relative stronger emotional reaction for an event that was identified as causing lasting distress is consistent with early models of PTSD that emphasized fear conditioning as the primary mechanism of symptoms (e.g., Keane, Zimering, & Caddell, 1985). Furthermore, there is a large body of evidence supporting the role of emotional arousal in the enhanced memory consolidation of emotional events (Cahill & McGaugh, 1998). How can the importance of emotions in fear conditioning and memory consolidation be understood in conjunction with the lack of predictive utility of meeting Criterion A2? Brewin and Holmes (2003) argued in their review of trauma and PTSD models that conditioning theories can explain some symptoms consistent with re-experiencing (e.g., experiencing fear when confronted with trauma cues) and avoidance; however, without consideration of cognitive elements that are not reliant on peritraumatic emotion, they are limited in explaining other symptoms of PTSD (e.g., memory components). For example, they asserted that the overturning of assumptions can also influence the number of trauma reminders, which can also contribute to other reexperiencing and avoidance symptoms. Thus, emotional reactions may be associated with certain aspects of PTSD, but multiple mechanisms beyond peritraumatic emotional reactivity may be needed to predict the multifaceted construct (i.e., diagnosis) of PTSD.

In the current study, 62.2% of participants who experienced a Criterion A1 event met Criterion A2, supporting the finding that Criterion A2 emotions are commonly associated with Criterion A1 events. This finding is slightly below the 76.6% of Criterion A1 events that met
Criterion A2 reported by Breslau and Kessler (2001). A commonly cited criticism of Criterion A2 is that individuals from professions that are trained to repeatedly confront traumatic events with emotional control (e.g., first responders), may not meet Criterion A2 but still meet all other criteria for PTSD. This has been a difficult claim to evaluate in first responders, as many studies do not assess Criterion A2. Studies that have assessed peritraumatic responses more generally have typically supported this claim. For example, in a comparison of female officers and civilians, the officers were generally exposed to more assaultive violence and more likely to select physical assaults as their worst trauma; however, they reported significantly less peritraumatic emotional distress than civilians (Lilly, Pole, Best, Metzler, & Marmar, 2009). However, Brunet et al. (2001) found that 90% of police officers who had experienced a critical incident endorsed at least one of the Criterion A2 responses. Clearly, more research is needed to understand the complex interaction of training, emotional reactions, and trauma characteristics that occurs for first responders.

4.5 Event Characteristics

4.5.1 Chaos

The perception of chaos during the event accounted for the most variance in the principal component analysis of the event characteristics. The sense of chaos appeared to stem from many aspects of the event. First, there were barriers preventing first responders from implementing normal procedures (e.g., unanticipated things happened, normal procedures not working, and things kept going wrong). First responders spend a great deal of their training learning the procedures to handle certain events. The ability to follow these procedures is especially important during complex events because they allow first responders to work together efficiently in an unspoken language. Second, the nature of the event made it difficult to determine which
procedures to implement (e.g., so much going on we did not know where to start, and the scene seemed chaotic), and to keep up with demands (e.g., events happened too quickly). Third, chaos was also associated with being confronted with a situation that perhaps the first responder was not prepared for (e.g., the situation was worse than expected). Finally, chaos also seemed to stem from a lack of direction on scene (e.g., lack of adequate supervision). It is possible that if this command structure had been available during the selected event that it may have prevented chaos. Alternatively, first responders may have seen the chaos as more manageable with more supervision.

The Chaos component represents perceptions of an event that could contribute to uncontrollability and unpredictability, as conceptualized by Foa et al. (1992). When normal procedures are not working, actions that typically stabilize a situation are unsuccessful. The situation may then become prolonged as problem solving takes place and other procedures are attempted. Indeed, the hallmark of uncontrollability is the lack of affect that an individual’s actions have on the duration of the trauma. Furthermore, when normal procedures are not working and unanticipated things are happening, typical signals of the end of the situation may be missing. In other words, such situations are unpredictable as standard cues of the resolution of the situation are not readily available to the first responder (e.g., stabilization of the patient).

4.5.2 Resource Limitations

The second component of the current analysis, Resource Limitations, represented a wide range of ways through which first responders perceived that they may not have had the optimal resources needed when confronted with a critical event. Isolation was rated as a relevant characteristic for the distressing event (e.g., far away from back up and waiting a long time for help). This finding was expected as rural and northern first responders often work in physically
isolated conditions with limited availability of other personnel. The need to be in charge of the scene was represented within the Resource Limitations component and could also be a consequence of this physical isolation from backup. This component also represented a broader need for more personnel (e.g., too much to do and not enough hands), which could also be related to being alone; however, it is also possible that many people were on scene, but that the scene was so complex that more personnel were needed. Finally, this component incorporated the role of the physical environment (e.g., harsh physical conditions) as a barrier to the optimal implementation of actions needed to address the situation. More broadly, such conditions could delay or prevent backup from arriving, cause difficulties with operating equipment, create problems with accessing a scene, or could drain the physical resources of the first responder.

The Resource Limitations component consolidated a number of findings from the broader literature on the impact of resources on first responders and military personnel. Broadly, the contribution of resources to characterizing a distressing event (i.e., an event that caused lasting PTSD symptoms) is similar to Bacharach et al.’s (2008) findings that resources played a role in both the distress and alcohol use after a critical incident. Fontana and Rosenheck (1999) found an association for military personnel between working in a rural area, being in harsh conditions, and inadequate resources. All three of these variables were represented in the Resource Limitations component. Additionally, there was a strong representation of not having backup in the current study. Comparably, Brown et al. (2002) included not having enough personnel as part of their Negative Cognitions and Emotions Factor. Finally, unlike Bacharach et. al’s findings, the Resource Limitations component did not explicitly incorporate features of conditional resources (i.e., training and preparedness) as a characteristic of the distressing event. However, the question assessing the provision of services outside scope of training was associated with this
component but it failed to meet the criteria for an acceptable factor loading. This suggests that training may play a role in defining a distressing event, but more research will be needed to explore this topic further in context of other resource limitations.

4.6 Prediction of PTSD Symptoms

The regression model predicting PTSD symptoms revealed three main conclusions: 1) common covariates did not predict PTSD symptoms with the exception of depressive symptoms, 2) meeting Criterion A did not significantly predict PTSD symptoms, and 3) both perceived chaos and resource limitations predicted PTSD symptoms when controlling for covariates and meeting Criterion A. Each of these conclusions will be considered in turn.

4.6.1 Covariates

In regard to demographic variables, age, education, and being in a relationship were not correlated with PTSD symptoms. Gender was weakly correlated with PTSD symptoms, with being female associated with more PTSD symptoms, but this association was no longer significant when entered in the regression analysis. These findings are not unexpected given the small effect size found for demographic variables in the meta-analysis conducted by Brewin et al. (2000). Commonly, the time worked as a first responder is predicted to either put individuals at risk for PTSD symptoms due to cumulative trauma exposure, or be a protective factor, presumably by the gradual development of coping strategies to deal with the repeated trauma exposure. However, the literature is mixed on whether length of employment is a viable predictor of PTSD symptoms. The current study is consistent with many studies (e.g., Corneil et al., 1999; Laposa & Alden, 2003) that have not found length of employment to affect PTSD symptoms. However, these results are at odds with other studies, such as the one conducted by Regehr Hill, Knott, et al. (2003) who found that more experienced firefighters demonstrated greater levels of
PTSD symptoms than did new recruits. Furthermore, overall length of employment predicted overall PTSD symptom severity.

In the current study, symptoms of depression were the strongest predictor of PTSD symptoms. A number of models have been proposed to explain this commonly found association (see Schindel-Allon, Aderka, Shahar, Stein, & Gilboa-Schechtma, 2010), one of which is a synchronous change model. According to this model, PTSD symptoms and depression may develop and change together over time as a consequence of a third factor, or factors, that has a causal impact on both conditions. Drawing conclusions about the etiological role of Criterion A1 events in the development of depression is complicated because the assessment of depression does not require that the symptoms be related to an event. Therefore, many studies assess depression after an event, but it is often unclear whether the onset of the current depression preceded the trauma. One exception is North et al. (1999) who found that after the Oklahoma bombing 56% of rescue workers with a major depressive disorder indicated that their depression did not exist prior to the bombing. Other studies have shown an increased rate of depression when measured after a Criterion A event (Kilpatrick & Acierno, 2003; McQuaid, Pedrelli, McCahill, & Stein, 2001; Shalev et al., 1998). However, research suggests that Criterion A exposure itself may not be a sufficient common etiology. Breslau, Davis, Peterson, and Schultz (2000) found that the risk for first onset major depression after a trauma was 2.8 times higher in exposed individuals with PTSD, but not significantly increased for exposed individuals who did not develop PTSD. One possible explanation consistent with the focus of this study is that the traumatic events that were associated with PTSD and major depression had characteristics theoretically relevant to both diagnoses.
Theoretically, the uncontrollability and unpredictability of stressors are hypothesized to play a role in both PTSD and depression. The influential animal model proposed by Foa et al. (1992) outlines the role of these variables in the development of PTSD. Animal models also support the role that these characteristics play in learned helplessness (Maier & Seligman, 1976), which is commonly cited as a contributing factor to depression (for a review see Henkel, Bussfeld, Möller, & Hegerl, 2002). In support of a joint etiology related to uncontrollability and unpredictability, Maier and Watkinson (2005) noted that some of the behavioural and neurobiological consequences of exposure to such stressors in animal models appear equally similar to the symptoms of depression and extreme anxiety. Moreover, multiple authors have observed from animal models that the neurobiological structures implicated in learned helplessness overlap with those thought to play a role in symptoms similar to both depression and PTSD (Hammack, Cooper, & Lazak, 2012; Maier & Watkins, 2005). As previously argued, the current study suggests that the trauma characteristics of chaos and resource limitations could affect controllability and predictability, and therefore be potential candidate variables for applying the synchronous change model to understanding the comorbidity of depression and PTSD.

It is important to acknowledge that the symptoms of depression and PTSD were measured at the same time, which does not allow for conclusions about the chronological order of the two. It is possible that the depressive symptoms preexisted the trauma, were a consequence of the trauma/PTSD symptoms, or were completely unrelated to the trauma/PTSD symptoms. Therefore, I cannot rule out other models that have been proposed to explain the comorbidity of depression and PTSD (see Schindel-Allon et al., 2010), such as the demoralization model (i.e., PTSD symptoms cause depression as a result of their consequences).
or the depressogenic model (i.e., the development and maintenance of PTSD is caused primarily by depressive symptoms and related constructs). Finally, authors such as Rosen and Lilienfeld (2008) have raised much larger conceptual questions about the comorbidity of PTSD with disorders such as depression. These authors asserted that many symptom criteria that define PTSD also comprise the diagnostic criteria of the disorders with which PTSD most commonly co-occurs. In their review of the literature, they concluded that the research raises the issue of whether PTSD should be reincorporated with the disorders that it shares common features, or whether it should remain a distinct diagnostic entity. It was not the purpose of this study to address these broader issues of depression and PTSD, but such issues must be acknowledged in the context of both cross-sectional research, and in understanding the comorbidity of depression and PTSD.

### 4.6.2 Lack of Criterion A Predictive Power

One purpose of Criterion A2 was to include subjective reactions that would be uncommon to stressful, yet ordinary, events. Some research supports the association of Criterion A2 with variables reflective event magnitude (see review by Weathers & Keane, 2007a). Weathers and Keane appeared to incorporate this assumption of magnitude when they labeled those events that meet Criterion A1 events as “potentially traumatic events” and those that additionally meet Criterion A2 as “traumatic events”. The inclusion criteria for the current study required that participants selected Criterion A1 events, that is all participants experienced a potentially traumatic event. The regression analysis revealed that fully meeting Criterion A (i.e., experiencing a traumatic event), did not predict PTSD symptom severity. In other words, there was no relationship between experiencing a traumatic event, a presumably more severe event than a potentially traumatic event, and the severity of PTSD symptoms. This finding echoes the
literature on the limited utility of meeting Criterion A in predicting PTSD diagnosis; requiring Criterion A2 does not substantially change the conditional probability of PTSD.

One proposed reason for the lack of specificity of Criterion A2 is that it does not capture the full range of emotions that can occur during or immediately after a Criterion A1 event. For example, in a retrospective study, individuals with PTSD were asked to relive their traumatic event and describe their emotions (Holmes, Grey, & Young, 2005). Although fear was the most commonly experienced emotion, other emotions such as sadness, anger, and surprise were reported at a higher frequency than helplessness and horror. Other reactions included shame and guilt. First responders also report a wide range of emotional responses to critical events. For example, Carlier and colleagues asked police officers to rate a number of critical incidents on 15 subjective characteristics. The events were characterized in terms of three patterns of responses. The first group of events was defined by sadness, numbness, and revulsion (e.g., performing an unsuccessful resuscitation, discovering a dead corpse). The second group, most similar to Criterion A2, comprised events characterized by feelings of danger, imitation, and anxiety (e.g., defending oneself in dangerous situations). The third group was associated with feelings of guilt and post-event preoccupation (e.g., shooting incidents, performing a resuscitation; Carlier et al., 2000).

These additional emotions have demonstrated utility in predicting PTSD symptoms. For example, anger experienced shortly after a traumatic event predicted later PTSD symptom severity across trauma types (Ehlers et al., 1998; Feeny, Zoellner, & Foa, 2000; Riggs, Dancu, Gershuny, Grennberg, & Foa, 1992), and has been found to be the strongest affective predictor of PTSD (Brewin et al., 2000). Additionally, guilt, which is thought to stem from the belief that one should have thought, felt or acted differently (Lee, Scragg, & Turner, 2001), was also linked
to PTSD symptom severity (Henning & Frueh, 1997). Thus, when considering the role of subjective emotional reactions in defining a traumatic event, theorists are confronted with both the empirical findings of a broader range of emotions associated with traumatic stressors, and the original purpose of Criterion A2 (i.e., the requirement of emotions likely to occur during objectively bad events).

4.6.3 Predictive Utility of Trauma Characteristics

This study demonstrated the unique contribution of both chaos and resource limitations to predicting PTSD symptoms when controlling for the influence of each other. Traumatic events are complex, and understanding multiple facets of the event can be important in predicting PTSD symptoms. Indeed, given that these characteristics predicted PTSD symptoms, when meeting Criterion A did not, speaks to the insufficiency of Criterion A in understanding traumas based on the dimensions of threat and the experience of fear, helplessness, and horror. Chaos was a stronger predictor than resource limitations. This finding is not surprising given the strong association found between chaos and other constructs associated with PTSD, namely peritraumatic dissociation and posttrauma cognitions. This is also consistent with the Alden (2005) finding that the factor of Multiple Traumas was the only predictor of PTSD symptoms, although resource limitations was not a dimension directly considered by these authors. In regard to resources, prior research with first responders has only linked resource limitations with general distress (Bacharach et al., 2008) and health problems (Brown et al., 2002). To my knowledge, this is the first study to link resources limitations directly to PTSD symptoms in first responders.

Some writers have suggested a shift in focus from studying the traumatic event to understanding other factors, such as individual differences, in the development of PTSD
(Brewin, Lanius, Novac, Schynder, & Galea, 2009). One potential reason for this movement away from the traumatic stressor is the difficulties with Criterion A as a predictive variable. Furthermore, early PTSD theorists envisioned that certain types of trauma would lead to PTSD in almost all people, despite individual differences or vulnerabilities (Brewin et al. 2009). However, the discovery of traumas with high conditional probabilities (i.e., that produce PTSD in many people that experience the same type of event) has been elusive. The findings of the current study suggest that movement away from studying the traumatic stressor based on such criticisms may prematurely hinder our understanding of PTSD. For example, this study demonstrated that characteristics of the traumatic stressor, as perceived by first responders, accounted for significant variance above individual factors, including depression. This study suggests that certain event characteristics may confer an increased risk for PTSD/PTSD symptoms regardless of individual differences, and thus be a fruitful avenue for identifying events with higher conditional probabilities.

4.7 Event Characteristics and the Cognitive Model

A primary objective of this study was to examine the influence of event characteristics on processes central to cognitive models of PTSD, namely peritraumatic processing and posttrauma cognitions. The utilization of structural equation modeling allowed for the simultaneous modeling of these cognitive pathways. Overall, the model revealed that traumas characterized by perceptions of chaos and resource limitations contributed to both dissociation and vulnerable posttrauma cognitions. Furthermore, the model allowed for the decomposition of each cognitive variable as a partial mediator of the relationship between trauma characteristics and PTSD symptoms. This study adds to the growing literature supporting the contribution of both dissociation and trauma cognitions to PTSD symptoms. Finally, after controlling for the
mediating effects of dissociation and beliefs, the trauma characteristics continued to predict PTSD symptoms. Each of these pathways will be considered in turn.

4.7.1 Peritraumatic Processing Pathway

Mental processing of the trauma is considered central in all recent cognitive models of PTSD, although the type of processing emphasized varies among them. The authors of these models acknowledge that a number of influences may interfere with peritraumatic cognitive processes, one of which is dissociation (Brewin et al., 1996; Ehlers & Clark 2000; Holmes, Brown, et al., 2005). Dissociation transcends these models as a marker of cognitive processing conducive to PTSD symptoms. The current results suggest that perceptions of chaos and resource limitations promote dissociative experiences during a traumatic event, which may interfere with the optimal encoding and consolidation of the trauma memory, and lead to subsequent PTSD symptoms.

One way event characteristics may promote dissociation is by causing increased peritraumatic distress (i.e., the emotional and physical reactions during the trauma). Indeed, in the current study, increased chaos during the event was associated with meeting Criterion A. Some theorists propose that dissociation is a consequence of peritraumatic distress (c.f. Khun, Blanchard, Fuse, Hickling, & Broderick, 2006). Specific to first responders, peritraumatic distress has been associated with dissociation in samples of police (Fikretoglu et al., 2006; Martin et al., 2009). In other samples, studies have found a positive relationship between peritraumatic dissociation and event-related physiological arousal, such as heart rate measured in the emergency room (Kuhn et al. 2006). The physical component of peritraumatic distress (i.e., panic symptoms) has received specific attention as a mediator in the relationship between peritraumatic emotions (i.e., fear) and peritraumatic dissociation, but this scenario has received
mixed support (Bernat, Ronfeldt, Calhoun, & Arias, 1998; Delahanty, Royer, Raimonde, & Spoonster, 2003; Shalev et al., 1998). Its application may be even more limited for first responders whose job it is to remain calm during critical situations. Specifically, Fikretoglu et al. (2007) found that panic completely mediated the association between Criterion A2 and dissociation for a civilian sample, however, the relationship was only partly mediated for police.

Other authors purport that dissociation offers a way to psychologically escape when physical escape is impossible (e.g. see Gershuny & Thayer, 1999). These authors commonly make reference to traumas that are experienced directly by the individual. However, an argument could be made that for first responders, who primarily witness traumas happening to other people, the situation might be perceived as inescapable because it is their job to be at the scene until it is resolved. This perception of inescapability could be even more salient when confronted with resource limitations, such as attending a critical situation in a physically isolated area. Moreover, scenes characterized by chaos may seem inescapable because regular procedures are not resolving the situation. Dissociation may also arise from the fatigue that is associated with inescapable situations. Hodgson and Webster (2011) found that reduced levels of alertness was associated with dissociation, and they speculated that reduced alertness may contribute to a state of unreality and possible perceptual distortions (features of dissociation) that may interfere with elaboration and integration of the trauma memory. Examining trauma characteristics that could apply to both directly experienced and witnessed events opens an intriguing line of research to expand theories such as the escape hypothesis of dissociation.

Dissociation may also be a mechanism to cope with the fear of losing control of both the situation and one’s reactions to it. Gershuny, Cloitre, and Otto (2003) assessed three aspects of peritraumatic control (i.e., control over the situation, control over emotions, and losing control of
oneself) in a sample of university women. They found that fear of losing control was one of the mediators of peritraumatic dissociation and PTSD symptoms. As previously discussed, one way first responders maintain control over a situation is by being able to follow procedures. The Chaos component had many descriptors suggestive of not having typical control over a situation (e.g., unanticipated things happened, normal procedures were not working, and so much going on we did not know where to start). Furthermore, having limited resources to deal with a situation (e.g., far away from back up, and too much to do but not enough hands) would also likely reduce control over the situation.

Although the current results provided further support for the role of peritraumatic dissociation in the development of PTSD symptoms, they also provided information about the relative contribution of dissociation within the context of other theoretically relevant variables. Dissociation has been demonstrated to be one of the strongest predictor of PTSD in meta-analytical studies examining the correlation between peritraumatic dissociation and PTSD symptoms (Lensvelt-Mulders, 2008; Ozer et al., 2003). In the current study, the correlation between PTSD symptoms and dissociation was of a moderate, bordering on large, effect size. However, when considered in the context of the event characteristics and posttrauma beliefs, the effect size fell in to small-medium range, the smallest effect size of all the variables. This decreased effect size is consistent with the findings of recent reviews that critically examined dissociation. For example, Van der hart, Van Ochten, Van Son, Steele, & Lensvelt-Mulders (2008) concluded that the effect of peritraumatic dissociation on PTSD symptoms over time was significantly diminished or disappeared after the authors took into account other variables, such as trauma-related persistent dissociation, personality traits, peritraumatic distress, negative interpretations of trauma memories, and initial PTSD symptom severity (see also Van der Velden
& Wittmann, 2008). This and other studies highlight the need for the testing of comprehensive models to determine whether dissociation may be less important as time progresses and other factors begin to operate (e.g., posttrauma cognitions).

Authors of cognitive models postulate that the nature of the trauma memory explains the link between dissociation and PTSD symptoms. In their review of this topic, Bedard-Gilligan and Zoellner (2012) highlighted the various definitions of trauma memory fragmentation (e.g., increased sensory components, abnormal chronology, and confusion). However, at the core of these definitions is a disturbance in memory that prevents it from being incorporated into autobiographical memory in a way that is organized. These authors concluded that there was inconsistent support for the association between dissociation and memory fragmentation, because only two out of the seven studies they reviewed supported a positive relationship (i.e., Halligan et al., 2003; Harvey & Bryant, 1999). Moreover, the link between memory fragmentation and PTSD is also contentious and many studies have not supported this association (see O'Kearney & Perrott, 2006; Zoellner & Bittenger, 2004). Thus, the exact mechanism through which dissociation contributes to PTSD symptoms requires further exploration.

4.7.2 Posttrauma Cognitions Pathway

Event characteristics, as perceived by participants, were associated with negative posttrauma cognitions (i.e., self-blame, self and world). This finding is consistent with current cognitive models of PTSD, and makes an important contribution to our understanding of how posttrauma cognitions may originate from the event itself. There are a number of ways through which these event characteristics could contribute to posttrauma cognitions, including interacting with pretrauma beliefs, and strengthening appraisals after the trauma.
Cognitive theories suggest at least two mechanisms through which trauma characteristics could interact with pretrauma beliefs to produce PTSD symptoms: confirmation and shattering. The limited number of prospective studies examining preexisting cognitions in first responders appears to indirectly support the confirmation hypothesis. The majority of these studies have focused on beliefs about the self because researchers have predicted that beliefs regarding self-competence and efficacy would be especially relevant for first responders who must take control of complex situations. Bryant and Guthrie (2007) used the Posttraumatic Cognitions Invention (PTCI) to measure the beliefs of firefighters when they were newly recruited and then again four years after commencing active duty. Negative pre-existing beliefs about oneself predicted subsequent PTSD, and accounted for 20% of the variance in PTSD symptoms, even when controlling for history of traumatic events, number of potentially traumatic events experienced as a firefighter, and preexisting PTSD and depressive symptoms. In a similar design, Heinrichs et al. (2005) found that a low level of self-efficacy at baseline accounted for significant variance in posttraumatic stress symptoms in firefighters two years after training. Although the interaction between pretrauma beliefs and event characteristics offers a theoretical interpretation of the current results, the current study only had participants evaluate their beliefs after the distressing event. Therefore, it is unknown whether these beliefs changed (i.e., strengthened) as a results of the index distressing event.

Posttrauma cognitions can be maintained by experiences that are interpreted by the individual as confirming his or her belief. For example, if an individual repeatedly experiences events that are characterized by chaos and resource limitations it may further solidify beliefs related to the self. Although a longitudinal study examining the reciprocal influence of trauma characteristics and negative self-beliefs has not been conducted, cross-sectional research may
shed some light on what happens to the beliefs of firefighters over the course of their career. Regehr, Hill, Knott, et al. (2003) compared firefighters who had just completed their initial training to experienced firefighters on measures of trauma exposure and self-efficacy. The recruits entered the fire service with already having had experienced a number of traumatic events; however, the experienced firefighters had more exposure to multiple casualties, death of a child, and witnessing violence to others. Notably, there was no difference between the groups with experiences of violence against themselves or near death experiences for themselves. Despite this widespread exposure to trauma in both groups, experienced firefighters had lower levels of self-efficacy. The authors speculated that the differences in self-efficacy could have arisen from age, education levels, or experience with limited career advancement. This study suggests another possibility: the experienced firefighters may have been confronted with events that were chaotic or occurred in the context of limited resources, which potentially contributed to lower self-efficacy through limited success in the face of such challenges.

Trauma characteristics can influence cognitions about the world through mechanisms similar to those discussed in the context of cognitions about oneself. Specifically, pretrauma cognitions about the predictability and safety of the world could be confirmed or shattered by traumatic events characterized by perceptions of chaos and resource limitations. First responders are equipped with the knowledge and skills to confront many dangerous situations not regularly faced by many members of the general public. Such training may make the world seem more manageable, despite being faced with seemingly extreme circumstances (e.g., severe injury, and extremely aggressive individuals). However, when first responders are in situations where their training does not make these situations more manageable, the dangerousness and unpredictability of the situations they face may become more salient. Chaos during an event would likely serve to
highlight these aspects of the world. Moreover, such situations may cause first responders to
doubt their ability to protect both themselves and others, which would further contribute to
cognitions about the world. In regards to role of resources, when forces external to the first
responder are responsible for limited resources the world may also be perceived as unpredictable
and dangerous. For example waiting for back-up might confirm thoughts that “you can’t rely on
others”. Additionally, having harsh weather develop and complicate the situation may signal that
“you never know what might happen next”. Further focus on trauma characteristics is needed to
examine how they may impact beliefs about the world more broadly.

The direct pathway found between negative posttrauma cognitions and PTSD symptoms
is well supported (Belsher et al., 2012; Bennett et al., 2009; Robinaugh et al., 2011). Moreover,
posttrauma cognitions were one of the strongest predictors of PTSD symptoms. This finding is
similar to that of Kleim et al. (2007) who found that negative appraisals of the self at 2 months
posttrauma was a stronger predictor of PTSD at 6 months posttrauma than dissociation, and was
one of the strongest predictors in the regression model. According to Ehlers and Clark (2000),
posttrauma cognitions contribute to a sense of current threat, which is either internal (e.g., I
cannot cope) or external (e.g. the world is dangerous), and maintains an on-going anxiety
response. Specifically, negative appraisals motivate other strategies in an attempt to control and
reduce the sense of current threat. One of the most common responses is avoidance of people,
places, and objects related to the trauma. For example, excessively negative appraisals of
intrusive imagery after a motor vehicle accident was associated with increased avoidance of
accident related thoughts and situations that could trigger other PTSD symptoms (Ehlers et al.,
1998; Steil & Ehlers, 2000). However, reactions such as avoidance only serve to maintain this
sense of threat, fear, and anxiety.
4.7.3 Direct Path to PTSD Symptoms

Given that peritraumatic dissociation and posttrauma cognitions only partially mediated the association between the event characteristics and PTSD symptoms, it is possible that events characterized by perceptions of chaos and resource limitations influenced other processes (i.e., mediators), which were not assessed in the current study, that in turn affected PTSD symptoms. For example, rumination about the trauma has been associated with PTSD symptom severity in both civilian (Mayou, Ehlers, & Bryant, 2002) and emergency response personnel (Clohessy & Ehlers, 1999; Laposa & Alden, 2003). Ehlers and Clark (2000) proposed that the “what if” nature of rumination may prevent the trauma memory from being integrated into autobiographical memory. First responders may be especially vulnerable to rumination after events characterized by chaos and resource limitations. For example, these situations may present many decision points to reconsider (e.g., what if I would have started somewhere else?). Moreover, intrusive memories after the incident may be viewed as threatening and the first responder may attempt to suppress them. A number of studies have demonstrated a paradoxical increase in intrusive thoughts following attempts to suppress them (e.g., Wegner, 1994), and support exists for this effect in the context of PTSD (Davies & Clark, 1998a; Davies & Clark, 1998b; Ehlers et al., 1998; Harvey & Bryant, 1998). In summary, the direct link between the event characteristics and PTSD symptoms further highlights the need to study the interactions between the event and theoretically important variables in the development of PTSD symptoms.

4.8 Implications for Criterion A

McNally (2003) has raised considerable concern about the inclusion of indirect, informational exposure to trauma as events that meet Criterion A1. He has termed this inclusion “bracket creep”, and argued that it can result in such a wide range of events being studied that it
may make it difficult to find underlying psychobiological mechanisms of PTSD. The next revision of the DSM appears to have addressed this bracket creep by eliminating most forms of exposure that do not involve being physically present at the event. Although the current study did not directly address the issue of bracket creep, it did support the contribution of events with direct threat to lasting distress. Specifically, repeated-measures $t$-tests on the Posttraumatic Diagnostic Scale (PDS) Criterion A1 questions indicated participants experienced significantly higher levels of threat of injury or death to themselves during the distressing event compared to the control event. Additionally, the degree of threat to others that was witnessed by first responders was rated high for both types of events. However, there was no significant difference between the events, which suggests that witnessing a potentially traumatic event alone does not distinguish that event from other gruesome events that do not cause lasting distress. It should be noted that unlike most situations that involve witnessing a traumatic event, first responders are not passive bystanders, but often play an active role that can influence the course of the event. Therefore, this increases the chance that other event characteristics could become important, such as controllability.

Despite concerns about bracket creep, multiple authors have suggested dispensing with Criterion A. Brewin et al. (2009) proposed diagnostic criteria that emphasized certain core symptoms of PTSD and the impairment criterion, but did not require a Criterion A event. These authors argued that such criteria would serve a gate-keeping function because it would be unlikely that they would be caused by events that were not severe. Moreover, Maier (2007) argued that Criterion A could be removed from the DSM without loss of diagnostic accuracy. Indeed, a collection of studies demonstrated that very few individuals (0 - .04%) who met PTSD criteria B-F did not experience a Criterion A1 event (Kilpatrick, Resnick, & Acierno, 2009).
Thus, the authors concluded that a non-restrictive definition of the traumatic stressor would not increase PTSD prevalence.

Alternatively, the Kilpatrick et al. (2009) studies also point to the possibility that Criterion A is necessary (i.e., few people develop PTSD without experiencing a Criterion A event), but not sufficient for the development of PTSD. For example, the authors reported that the conditional prevalence rate of PTSD after meeting Criterion A1 in the Florida Hurricane Study was only 4.1%. The current study found that in the context of events that met Criterion A1, resource limitations and chaos predicted PTSD symptoms. It seems unlikely that these characteristics would be perceived as relevant during non-Criterion A1 emergency service situations. For example, limitations in resources may not be a problem when assisting someone with minor injuries. Moreover, it also doubtful that an event would be chaotic if it was not life-threatening, or if there was not a sense of urgency. A sufficient definition of a traumatic stressor might need to include these other characteristics, which may be more likely during Criterion A events. As previously argued, if Criterion A is necessary, then removing it from the diagnostic criteria could potentially reduce research attempting to understand the traumatic stressor.

Weathers and Keane (2007b) noted that if PTSD continues to be conceptualized as a stress-response syndrome, then the stressor will need to be reflected in the diagnostic criteria (e.g., Weathers & Keane, 2007b). For example, McNally (2009) asserted that the memory of the trauma is at the heart of PTSD, and that it ties diverse symptoms into a coherent syndrome (e.g., one cannot have intrusive memories in the abstract). Indeed, Brewin et al.’s (2009) proposed PTSD criteria still made reference to an event. For example, reexperiencing symptoms would reflect an “event now perceived as having severely threatened someone’s physical or psychological well-being” (pg. 370). Therefore, although the results of the current study further
support the lack of predictive utility of Criterion A, they do not fully support the removal of Criterion A because the characteristics perceived as relevant occurred during these types of events were found to be predictive of PTSD symptoms.

4.9 Possible Professional Differences

The results indicated that the covariance matrices were potentially different for the firefighters compared to the paramedics and RCMP, whereas the matrices for the paramedics and RCMP were not significantly different. This suggested that the relationship among the Description of Event Questionnaire (DEQ) items were different for the firefighters compared to the other groups. Further analyses revealed that a potential source of this difference was the inclusion of two questions: 1) lack of adequate supervision at the scene, and 2) having inadequate resources. These differences are not unexpected given the different work environments of the three professions. Firefighters are typically dispatched as a team on a fire engine. This team approach likely ensures that at least one person has seniority and will take charge of the scene. Furthermore, being dispatched on the fire engine may increase the likelihood that many of the resources needed by the firefighters will be readily available. On the other hand, paramedics and RCMP are more likely to either work alone or in smaller teams.

Despite these professional differences, the literature suggests that the characteristics of chaos and resource limitations also apply to firefighters. Indeed, much of the research with first responders examining resource difficulties has been conducted with firefighters. For example, Bacharach et al.’s (2008) study that focused on the link between resources and distress sampled professional firefighters. Brown et al. (2002), who included not having enough personnel as part of their Negative Cognitions and Emotions factor, surveyed firefighters in Northern Ireland. They found that this factor was related to scores on the General Health Questionnaire. Finally,
Bryant and Harvey (1996) found that 60% of volunteer firefighters believed that general stress as a firefighter was related to either helplessness over conditions, exhaustion, or inadequate equipment or training.

### 4.10 Limitations

A number of limitations must be kept in mind when interpreting the results of the current study. First, the data for this study were collected using a cross-sectional design, which has a number of implications for the statistical models. Although the directional pathways and mediational analyses were proposed according to both theoretical and temporal relationships, this cross-sectional design does not allow for causal conclusions. For example, both the PTCI-A (posttrauma cognitions) and PDS (PTSD symptoms) were completed in reference to a current time period. Furthermore, it is likely that the relationship between posttrauma cognitions and PTSD symptoms is bidirectional, with negative cognitions (e.g., I cannot cope) contributing to PTSD symptoms (e.g., avoiding trauma reminders to prevent intrusive memories), which further confirms the negative cognitions (e.g., I really can’t cope if I can’t go back to the scene). Finally, vulnerability factors, such as neuroticism, were not measured prior to trauma exposure and therefore could not be considered as covariates in the regression or structural models. Relevant to the current study, research with Dutch army soldiers demonstrated that neuroticism partially explained the relationship between the perception of the severity of minor stressors while deployed (e.g., enduring the weather, lack of personal space) and the severity and PTSD symptoms (Engelhard & Van den Hout, 2007).

Second, this study relied on the retrospective report of Criterion A trauma descriptors (i.e., PDS), event characteristics (i.e., DEQ), and peritraumatic dissociation (i.e., PDEQ). Retrospective reports can be influenced by a number of factors including current PTSD
symptoms and depression. Current symptoms of PTSD can affect the perception of prior distress. Harvey and Bryant (2000) found that individuals’ *retrospective* perception of their symptoms of acute stress disorder (ASD) was related to their current PTSD symptom severity. Specifically, low PTSD symptoms at 2 years posttrauma was associated with omitting ASD symptoms at recall. Conversely, high PTSD symptoms at 2 years posttrauma was associated with recalling the presence of ASD symptoms that were not reported in the acute phase. Current PTSD symptoms may also affect the perception of past trauma exposure. For example, Engelhard, van den Hout and McNally (2008) had war veterans report their exposure to traumatic and nontraumatic events prior to deployment. One year later, greater PTSD symptoms were associated with recalling more traumatic and nontraumatic events than previously reported. Additionally, it is also possible that current symptoms of depression influenced the perception of event characteristics. However, the fact that event characteristics accounted for 10% additional variance in PTSD symptoms above depression suggested that the association between event characteristics and PTSD symptoms was not solely the result of a depressive influence on retrospective memory.

The sampling method also presents some possible limitations. First, participants from each profession were recruited using different methods. This was done in an attempt to maximize the total sample size by matching the recruitment method to the organizational structure of each profession. However, it is possible that these different recruitment methods influenced who participated from each profession. Secondly, since participants were not randomly sampled, it is possible that a self-selection bias (e.g., PTSD symptom level or feelings toward the agency) affected who agreed to participate. It is notable, however, that the level of PTSD symptoms in this sample was not substantially different from other samples, which suggests that if a self-
selection bias was operating, it was not significantly different from other studies.

Although this study provided valuable information on rural and northern first responders, the characteristics of this sample may also affect the generalizability of the results. First, it is unclear how the Resource Limitations and Chaos components would replicate in a sample of urban first responders who may not be faced with the same conditions as rural responders (e.g., being far away from back-up). However, much of the research reviewed for the development of the DEQ was conducted with largely urban samples, which suggests that the components found in this study are not unique to rural and northern first responders. Second, this sample was predominantly male, which is common for studies of first responders. It is unclear if a sample comprised of a larger number of women may have provided different results. For example, some research has found that women officers were more likely to experience confrontation with abused children (Gehrke & Violanti, 2006), whereas other studies have demonstrated no significant gender differences in duty-related trauma exposure, peritraumatic dissociation, or PTSD symptom severity (Pole et al., 2001). Finally, the generalization of the results from this sample to the population must be tempered because the exact questionnaire response rate is unknown and information could not be gathered concerning any potential differences between study responders and non-responders. Such information is important when interpreting the types of traumas that participants chose for their distressing and control events, and the rates of PTSD symptom severity.

This study relied solely on the self-report of the first responders. Clinical interviews are considered the gold-standard assessment method, and interviews have generally found lower rates of PTSD and PTSD symptoms when compared to self-report measures. Although the use of clinical interviews has clear advantages, this methodology would have had the clear
disadvantage of reducing the number of participants that could have feasibly been recruited for the current study. A larger sample size was prioritized since this was an exploratory study with the purpose of examining a breadth of trauma characteristics to identify underlying components. Additionally, this was a sample of active first responders who may have been reluctant to fully endorse trauma-related symptomology. Social desirability in the first responder population could stem from various influences, including a self-image promoted by a culture where psychological difficulties may be minimized. Moreover, although many steps were taken to convey the confidentiality of participation, it is possible that some participants were still cautious in their responses. Finally, the use of self-report meant that the trauma characteristics reflected participants’ perceptions of the traumatic stressor rather than an objective assessment (e.g., information from departmental records or third party observation of the traumatic event). The reliance on self-report to assess the traumatic stressor reflects the reality faced by clinicians who must diagnose the presence of Criterion A and many researchers who investigate the nature of trauma. However, in the present study, participants’ perception of the trauma characteristics could have been influenced by individual differences (e.g., personality features) and therefore not purely reflect the characteristics of the event.

Finally, the results of this study are reflective of a non-clinical sample of employed individuals. Although research supports the existence of PTSD on a continuum, it is still unclear how these results would apply to a sample of individuals with PTSD and potentially off work as a result of a critical incident.

4.11 Strengths and Contributions

This study contributes to the literature in a number of important ways. First, many studies with first responders have measured aspects of the general work environment (e.g., overall
resource availability and social climate), and some studies have linked these characteristics to general measures of health or “distress”. This study took an important step by asking participants to rate the relevance of these characteristics for a particular event and then linked the characteristics specifically to the PTSD symptoms associated with that event. This specificity allowed for the examination of previously identified event characteristics in the context of PTSD and Criterion A. Moreover, all participants experienced the events for which they rated the event characteristics, which built on those studies that required participants to speculate on how they would feel under certain circumstances (e.g., Beaton et al., 1998). This focus allowed for a number of novel contributions to the literature regarding Criterion A and PTSD.

The DEQ was developed (Alden et al., 2004), and then revised for this study, with the purpose of assessing characteristics in reference to a specific event. Therefore, participants were able to rate the relevance of these characteristics for both a traumatic and control event. This repeated-measures design provided a comparison of events while reducing unsystematic variation (e.g., individual differences) between the two conditions. The comparison of these two types of events provided information about whether specific characteristics were more relevant to traumatic events, or equally relevant to other nontraumatic Criterion A1 events (i.e., control events), and therefore less likely to be of etiological significance for PTSD. To my knowledge, this is the first study to utilize this methodology for studying the traumatic stressor.

Assessing symptoms of a specific syndrome (i.e., PTSD) permitted the application of various extant models (e.g., animal models of predictability and controllability, cognitive models of PTSD) to examine the relationship between trauma characteristics and other theoretically important variables. This is one of few studies that has modeled simultaneous predictions made about the traumatic stressor, peritraumatic dissociation, and posttrauma cognitions. Moreover, to
my knowledge, no published study has used structural equation modeling (SEM) to model these
types of trauma characteristics. In addition to the parsimonious testing of multiple predictions
allowed by SEM, the conclusions about PTSD symptoms are further strengthened by using the
PDS, a well-validated measure of PTSD that assessed all DSM-IV criteria.

Another novel contribution of this study was the direct comparison of Criterion A and
event characteristics as predictors of PTSD symptoms. Pitting these two conceptualizations
against each other in the regression analysis allowed for the conclusion that other aspects of the
traumatic stressor, beyond Criterion A, are important in the development of PTSD symptoms.
This analysis also informed a number of contemporary issues concerning PTSD, including the
relative importance of the traumatic stressor compared to individual differences, the relative
importance of Criterion A1 and A2, and alternative conceptualizations of the role of Criterion A
in the development of PTSD symptoms (i.e., perhaps being necessary but not sufficient).

As previously discussed, this study provided information on an understudied population,
namely rural and northern first responders. To my knowledge, no other published research has
examined PTSD symptoms simultaneously in these three professions from a rural and northern
Canadian setting. The results of this study offer preliminary benchmarks from which to compare
variables such as the distribution of PTSD symptom severity, the relative importance of chaos
and resource limitations, and the types of traumas selected as distressing.

4.12 Applications

With replication, this study could have important applications for first responders.
Supervisors, managers, and first responders could be provided with a list of trauma
characteristics that could assist with the early identification of those individuals who might be
more likely to develop PTSD symptoms given the type of event they experienced. Indeed,
agency partners involved with this study indicated that it would be helpful to have a better understanding of what events they should be particularly aware of that have the potential to cause distress. However, having the tools for the early identification of at-risk individuals does not automatically lend support for the immediate intervention after such events, particularly using critical incident stress debriefing (CISD). CISD commonly involves a session, or multiple sessions, often conducted in groups and consists of a combination of discussing the incident, reactions to the incident (e.g., cognitions, emotions, and potential symptoms) and psychoeducation. Despite its widespread use, much research has demonstrated that CISD with first responders either has no effect (e.g., Harris, Baloğlu, & Stacks, 2002), or an iatrogenic effect on PTSD symptoms and other outcome measures at various follow-up periods (e.g., Carlier, Lamberts, Van Uchelen, & Berthold, 1998; Carlier, Voerman, & Gersons, 2000). Further research is necessary to explicate the most effective ways to intervene following traumatic stressors marked by chaos and resource limitations.

This research could also inform procedures designed to proactively prepare first responders for challenging and potentially traumatic events. Research has indicated that first responders feel that more of this type of preparation (e.g., pre-incident briefing and training) would be helpful (Alexander & Klein, 2001). The effectiveness of inoculation/resilience training for first responders has become a burgeoning area of research. Arnetz, Nevedal, Lumley, Backman, and Lublin (2009) investigated a 10-week program that involved the use of verbally presented scripts of various critical incidents to assist participants with creating mental images of these events, and pairing them with mentally rehearsed appropriate responses. Participants were also provided with cognitive and behavioural skills training in effective coping techniques (e.g., using cue-controlled relaxation to achieve optimal focus, effective weapons management, and
navigating novel environments during a critical incident). Officers were then exposed to a simulated critical incident. When compared to a control group, officers in the training program experienced decreased subjective distress and physiological stress reactions during the simulation, and were rated by blind observers as performing better. Individuals designing these programs could incorporate event characteristics (e.g., chaos and resource limitation) into exercises such as visualization and training simulations. Preparation for these incidents might reduce their impact on processes, such as dissociation, that are associated with PTSD symptoms.

4.13 Areas for Future Research

This study provided information about the associations between event characteristics, cognitive processes, and PTSD symptoms. However, the conclusions drawn from the structural equation model require replication by longitudinal research that measures the event characteristics and peritraumatic dissociation immediately after the event. Posttrauma cognitions and PTSD symptoms could then be measured in intervals after the event to assist with modeling bi-directional relationships. Furthermore, replication with a longitudinal design would further validate the DEQ, and strengthen it as a comprehensive method of assessing the traumatic stressor. Finally, longitudinal research would allow for the measurement of vulnerability factors, such as neuroticism, prior to the index event exposure.

Results from the principal component analysis are a function of the composition of questions that were included in the DEQ. Because it was an exploratory measure, there is room to build upon some of the findings. During the analysis, eight items did not have a strong enough association with other items to justify their inclusion in the analysis. These questions assessed characteristics such as coworker support, the malicious intent of the act, and a personal connection with the family member (e.g., identification or knowing the victim). These items may
be worth examining in further detail, either as their own focus of research, or included in another version of the DEQ with additional items that assess similar characteristics.

In order to keep the questionnaire packet a feasible length, not all measures were included that could also have had an impact on PTSD symptoms, or be associated with the cognitive variables of interest. The examination of these results within the larger literature suggests that future research may want to include measures that assess posttrauma variables such as rumination and thought suppression. Additionally, because research with active first responders occurs within a work context, there has been a focus on general organizational stressors/hassles (e.g., Brough, 2004; Huddleston, Stephens, & Paton, 2007). Future research may want to assess the organizational climate and determine how it might interact with specific event characteristics. For example, one influential theoretical model that might be of interest is Karasek’s Demand-Control-Support (DCS) model of work stress. According to this model, a psychological work environment can be characterized in terms of three dimensions: job control, job demand, and support by colleagues and supervisors (Karasek, 1979; Karasek et al., 1998). In the work stress literature, high demand, low control, and low support predict high stress, sick leave, and absenteeism from work (de Lange, Taris, Kompier, Houtman, & Bongers, 2003; Verhaeghe, Mak, Van Maele, Kornitzer, De Backer, 2003).

Finally, this research suggested that first responders experience a number of gruesome events that do not cause lasting distress. Knowing the characteristics of events that reduce the likelihood of PTSD symptoms would be informative from a resiliency perspective. Moreover, it would be helpful to assess what strategies help during events characterized by chaos and resource limitations that may offset resultant PTSD symptoms. Researchers have proposed the utility of mental planning during a trauma as a protective factor, which has been associated with
reduced PTSD in samples of assault victims (Dunmore, Clark, & Ehlers, 1997; Ehlers et al., 1998). Laposa and Alden (2006) found that during critical incidents, emergency room personnel directed their attention to the technical aspects of their work, which the authors labeled as “medical focused strategies.” Examples of these strategies included assessing the situation, implementing step-by-step medical techniques, and problem solving. The authors then used an analogue study to demonstrate that participants instructed to use medical processing while watching a medical movie reported fewer intrusive thoughts of the film over the subsequent week, compared to the control participants. Although one proposed implication of the current results was that chaos and resource limitations may interfere with following procedures, it would be helpful to determine if actively using mental planning strategies is either affected by the such trauma characteristics, or if it can offset their effects.

4.14 Conclusions

The current study aimed to identify characteristics of Criterion A1 events that were associated with lasting symptoms of PTSD in rural and northern first responders. To address this goal, a novel repeated-measures design was used to compare the characteristics of Criterion A1 events associated with ongoing distress (i.e., the “distressing” event) to those of Criterion A1 events that did not (i.e., the control event). Characteristics of chaos and resource limitations were both rated as significantly more descriptive for distressing events compared to control events. As hypothesized, both of these characteristics predicted PTSD symptoms above covariates, and simply meeting Criterion A. Moreover, the results demonstrated that the affect of the event characteristics on PTSD symptoms was partially mediated by peritraumatic dissociation and posttrauma cognitions. Overall, the results of this study are novel as they indicated that it is
important to examine event characteristics beyond those of Criterion A, and that such characteristics can be understood in context of current cognitive models of PTSD.
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