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**SOCIAL-COGNITIVE PROCESS IN
POSTTRAUMATIC STRESS DISORDER IN
MOTOR VEHICLE ACCIDENT SURVIVORS**

Lynn Miller

A thesis submitted to the School of Graduate Studies of the
University of Ottawa as partial fulfillment of the requirements
for the degree of Doctor of Philosophy



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DEDICATION

To my three sons,
Kevin, Shawn, and Ryan.
May they find and follow their dreams.

In memory of my mother,
Gert Lalonde, 1922-2000.
She taught me that hopes and dreams can come true.
The submission of this thesis fulfills one of her dreams.

In memory of my friend,
John Begley, 1955-2000.
His exceptional courage and perseverance
in meeting life's challenges and beating the odds
were an inspiration.

ACKNOWLEDGMENTS

The successful completion of this thesis would be but a dream were it not for the unique and important contributions of so many others. I would like to acknowledge my thesis supervisor, Dr. Ken Reesor. Ken's optimism, understanding, support, respect and guidance throughout graduate school were invaluable. Ken was truly an exceptional supervisor.

I would also like to thank my thesis committee members, Dr. Joyce D'Eon, Dr. Keith Wilson, and Dr. John Hunsley for excellent suggestions and feedback. Dr. Michael McCarrey deserves thanks for the role he played in the initial stages of the thesis. I am much obliged to Joyce who so graciously accepted to join the committee at such a late stage in the process and to Dr. Michael Sullivan who acted as external examiner.

I am especially indebted to Dr. Sandra Burns. Sandra believed that I could fly even during those times when I could barely crawl. She encouraged me to reach for my dream and helped me through many challenging times. I could not have successfully completed this thesis without her wisdom and support.

The care and support of my health care team were also instrumental in the completion of this thesis. I am very grateful to my physician, Dr. Lawrence Deutsch, an ally in healing and pain management. The knowledge and skill of the physiotherapists and assistants at Carole Beere Physiotherapy, in particular, Carole Beere and Katherine Pangapko eased my pain and made it possible for me to work through the many physically taxing times. They remained cheerful, patient, and encouraging even when I undermined their excellent work by carrying on with the tasks necessary to complete this thesis.

I am much indebted to Dr. Shelley Jordan, my friend and unofficial statistical advisor. Her knowledge, patience, advice and support helped me through the statistical requirements of the graduate program and the thesis. Shelley's assistance and persistence enabled me to complete a

task which seemed beyond my capabilities. I appreciate her help all the more because she so willingly answered endless questions while she was working on her own thesis.

I greatly appreciated Lynn Brown-Rae's unique sense of humor during the darkest days of thesis completion. Her encouragement was invaluable.

I also owe a debt of gratitude to a number of very special people. Audrey Jodoin's caring and encouragement touched me profoundly. Berthe Tiozzo provided friendship, hospitality, vision, and practical help. Myrna Adam not only encouraged and supported me, she provided friendship, humor, respite, and balance. She reminded me to stop and smell the roses. Lucie Perrier assisted me and spurred me on at just the right moments.

A very special thank you belongs to my husband, Bill, who surely could not have imagined what lay ahead when he encouraged me to pursue my dream. As he shared many of the trials and tribulations associated with the completion of this thesis, he steadfastly supported me and unwaveringly believed in me.

Finally, I would like to thank all of the health care centers, support groups, and participants who were so vital to this research project. I hope that the participants who shared their stories, their courage, and their suffering will somehow benefit from this research.

ABSTRACT

Posttraumatic stress disorder (PTSD) is a common sequela in those individuals who survive or witness an event such as a motor vehicle accident (MVA) that may threaten personal and interpersonal integrity. Yet, not all individuals who experience MVAs develop PTSD. It was hypothesized that MVA survivors who developed PTSD would evidence dysfunctional thinking characterized by maladaptive rules, assumptions, and interpretations, or schema specific to road traffic situations. Such dysfunctional thinking patterns were thought to be associated with individuals' perceptions of increased threat in road traffic situations and with PTSD in survivors of MVAs. The study also sought to explore the possible modifying effect that social interactional influences may have on maladaptive schema. In Study 1, a Motor Vehicle-Related Schema (MVRS) questionnaire was developed as a tool to tap the content of a potential dysfunctional thought process germane to road traffic situations. In Study 2, MVA survivors who developed PTSD were compared to MVA survivors who did not develop PTSD. A group of injured workers and a community sample were used as control groups. The control groups allowed the researcher to address the question of specificity of maladaptive schema related to road traffic situations in the MVA PTSD group. Multiple measures were used to assess the presence or absence of PTSD. Participants in the MVA PTSD group endorsed significantly higher levels of dysfunctional and maladaptive cognitions specific to road traffic situations than did all other participant groups. Given that other factors might influence this type of thought process, a number of other variables were examined. The findings remained robust even after adjustment for: (a) persistent dysfunctional schemas tapping general personal and interpersonal vulnerability, (b) subjective pain, and (c) self-reported depression. In addition, MVA survivors who developed PTSD, compared to MVA survivors who did not develop PTSD, reported significantly lower levels of perceived beneficial social interactions. However, these findings became non-significant after adjustment for subjective pain and self-reported depression. Overall, the findings suggest that MVA survivors who developed PTSD organized and interpreted stimuli relevant to road traffic situations in ways that were fundamentally different from MVA survivors who did not develop PTSD, injured workers and a community sample. More specifically, participants in the MVA PTSD group tended to interpret road traffic situations as more threatening than did participants in

the other groups in this study. The perception of lower levels of beneficial social interactions appear to be associated more with heightened levels of distress, pain, and depression than with PTSD. This investigation demonstrates that it is possible to tap into maladaptive schemas using a self-report measure. Consistent with cognitive-behavioral clinical protocols for MVA survivors with PTSD, these results support the notion that specific dysfunctional or maladaptive cognitions appear to characterize MVA survivors with PTSD. A better understanding of dysfunctional schemas specific to road traffic situations, gleaned through further research, may be of some benefit in attenuating or managing symptoms of PTSD in MVA survivors. Although the injured workers were not the focus of this research, many of the participants in this group met the classification for PTSD or posttraumatic stress symptoms (PTSS). This finding suggests that clinical screening and further research for PTSD in injured workers might also be warranted.

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INTRODUCTION

It has long been recognized that exposure to certain actual or perceived traumatic life experiences or events such as war, life-threatening illness, or motor vehicle accident (MVA), profoundly affects some, but not all, individuals. The post-event sequelae observed in those most seriously affected by trauma generally include a re-experiencing of the event (e.g., flashbacks, nightmares), chronic avoidance of reminders of the traumatic event, and hyperarousal (e.g., exaggerated startle, irritability, sleep difficulties). Such a constellation of symptoms following a traumatic event, persisting for at least 1 month, and interfering with functioning (e.g., social, occupational), constitutes a diagnosis of Posttraumatic Stress Disorder (PTSD) according to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV; APA, 1994a).

PTSD was first recognized as a distinct diagnostic category in the DSM-III (APA, 1980). Prior to that, human reaction to disasters and other extraordinary events were labeled as "traumatic neurosis" (Miller, 1961), "lightning neurosis, railroad spine, shell shock, etc." (Kardiner, 1941, p.V). In this century, World War II and the Vietnam war spurred considerable interest into the psychological sequelae of traumatic events (Kardiner, 1941; Peterson, Prout, & Schwarz, 1991). Although research has long focused on PTSD in war veterans, studies in the past 15 years have also examined post-traumatic sequelae of a number of other events such as rapes, robberies, assaults, natural disasters, and various types of accidents which are now identified as potential etiological conditions for PTSD (APA, 1994a, p. 424).

More recently, some research has focused on PTSD in MVA survivors. In this study, MVA survivors are those individuals who have survived an MVA despite any injuries they may have sustained. The interest in MVA survivors is appropriate considering that, in 1997 alone, 152,689 reported MVAs in Canada resulted in 221,186 injured persons and 3,064 traffic fatalities (Transport Canada, 1998). Further, physically injured survivors of Canadian MVAs have been found to report a variety of physical and psychosocial problems even years after the crash (Slocum, 1981).

The physical and psychological sequelae of MVAs are frequent and can be persistent. Physical injuries (Transport Canada, 1998), including whiplash and other musculoskeletal injuries, are common (Mayou, Bryant, & Duthie, 1993; Koch & Taylor, 1995). Even minor injuries may

become problematic because of associated pain and subsequent emotional distress (Mayou et al., 1993). Anxiety and phobic reactions related to reminders of events or cues associated with MVAs are common and sometimes result in long-lasting psychological sequelae to MVAs (Bryant & Harvey, 1998; Hickling, Blanchard, Silverman, & Schwarz, 1992; Kuch, Cox, Evans, & Shulman, 1994; Kuch, Evans, Watson, Bubela, & Cox, 1991). For example, in a study by Blanchard, Hickling, Taylor, Loos, and Gerardi (1994), 100% of the recent (i.e., 1 to 4 months post-accident) injured MVA survivors reported avoidance of specific driving conditions or situations as well as decreased driving pleasure. Moreover, a study by Mayou, Simkin, and Threlfall (1991) found that, even 4 to 6 years post-MVA, more than 30% of respondents reported driving anxiety and anxiety related to specific accident cues. In addition, Blanchard, Hickling, Vollmer, and Loos (1995) identified a subset of distressed MVA survivors who reported a number of posttraumatic stress symptoms (PTSS) but did not meet the full DSM-IV (APA, 1994a) criteria for PTSD. More specifically, those with PTSS met criteria A and B, but met only criterion C or criterion D, not both. In samples of MVA survivors studied 1 month to 2 years post-MVA, rates for PTSD and for PTSS have ranged from 11% to 46% and 20% to 23%, respectively (Blanchard et al., 1994; Kuch et al., 1994; Mayou et al., 1993).

Furthermore, physical, psychological, and social sequelae of MVAs are intertwined and are likely to have reciprocal impacts. For instance, in a study by Harvey and Bryant (1998b), driving anxiety predicted acute distress within 1 month post-MVA as well as PTSD at 6 months post-MVA. Ongoing health problems arising from MVA injuries may turn into chronic stressors which may ultimately contribute to driving anxiety by acting as continuous reminders of the MVA and learned cues to avoid driving (Ehlers, Mayou, & Bryant, 1998; Koch & Taylor, 1995). Ongoing health problems may also prevent MVA survivors from driving for a considerable time after an accident (Mayou et al., 1991), perhaps inadvertently contributing to driving anxiety, ongoing financial difficulties (due to impairment in ability to work, treatment costs, etc.) or both. In a study by Ehlers et al. (1998), accident-related ongoing health problems and financial difficulties predicted PTSD at 3 months and 1 year post-MVA. Furthermore, if ongoing health and financial problems increase the likelihood of litigation, those experiencing such problems may face additional risk for PTSD. For instance, studies by Blanchard, Hickling, et al. (1998) and Ehlers et

al. (1998) suggest that PTSD symptomatology may be maintained by litigation processes such as interrogations, delays, and settlements which can disrupt rehabilitation, treatment, and recovery. Such litigation processes potentially contribute to a persistent sense of threat and to the presence of disturbing MVA-related thoughts. Additionally, given that MVA survivors are members of a larger community, accident-related sequelae may well impact on psychosocial functioning. For instance, a number of MVA survivors' relatives (25%) studied by Malt, Hoivik, and Blikra (1993) reported that the MVA negatively impacted on relationships, recreation, work, and financial situation.

Due to our reliance on motor vehicles for transportation and travel, the use of motor vehicles is a major and often daily necessity for most Canadians. Disorders such as accident phobia and PTSD which affect willingness to be in a motor vehicle, either as a driver or as a passenger, can therefore be very problematic for both affected individuals and their families because of the personal, financial, and societal costs these disorders may incur. Yet, both phobias and PTSD associated with MVAs may go unrecognized and untreated (M. M. Green, McFarlane, Hunter, & Griggs, 1993; Kuch, 1989).

Existing research, focused primarily on combat veterans, and, less so, on survivors of other traumatic events, has been instrumental in the recognition of PTSD, the introduction of PTSD as a diagnostic category, and the ongoing evolution of the concept of PTSD. However, given the frequency of MVA and the trauma that ensues, there remains a relative paucity of research in understanding the factors or processes that may underlie the etiology, maintenance, or exacerbation of PTSD in MVA survivors. In addition, research pertinent to the treatment of PTSD in MVA survivors is "quite sparse" (Blanchard & Hickling, 1997, p. 241). The Blanchard and Hickling (1997) review of the literature indicates that treatment of MVA survivors with PTSD generally adheres to cognitive behavioral treatment models that include exposure (i.e., imaginal, in vivo, or both), thought stopping, and cognitive restructuring. Implicit in these treatment models is the assumption that maladaptive cognitive processes (e.g., dysfunctional beliefs, distorted schema) may serve to maintain problematic behavior or emotional reactions. Therefore, treatment of MVA survivors is focused on identifying and modifying these maladaptive cognitive processes (Blanchard & Hickling, 1997).

Maladaptive schemas are central to cognitive models of depression (Beck, Rush, Shaw, & Emery, 1979) and personality disorders (Young, 1994). Schemas are hypothetical constructs, prototypes, or mental templates which allow for the filtering, encoding, and appraisal of stimuli (Beck, Emery, & Greenberg, 1985; Beck et al., 1979). According to Beck et al. (1979, 1985), schemas facilitate the classification and conceptualization of perceptions, objects, and experiences. Even though any given stimulus may be interpreted in a number of different ways, a specific individual tends to repeatedly interpret the stimulus in the same way. Consequently, the cognitive, affective, and behavioral reactions to a specific stimulus are determined by the individual's templates or schemas relevant to that stimulus. Maladaptive or dysfunctional schemas increase distress and promote avoidance.

Despite the importance of schemas in other clinical disorders, little attention has been paid to schemas in PTSD, cognitive content relevant to motor vehicles (including the operation of motor vehicles), or to cognitive processes or schemas in MVA survivors. Previous investigations (Harvey, Bryant & Dang, 1998; Warda & Bryant, 1998a) suggest that MVA survivors appraise stimuli relevant to road traffic situations according to specific mental templates or motor vehicle-related schema (MVRS). However, previous research provides little evidence that schemas or cognitive processes distinguish MVA survivors who subsequently develop PTSD from those who do not develop PTSD. Further, previous investigations provide little insight into how social interactions may impact on MVRS or other more fundamental schemas. Yet the treatment of MVA survivors with PTSD, as described by Blanchard and Hickling (1997), is grounded on the premise that significant others can effectively provide encouragement, promote engagement, and challenge maladaptive cognitions. The underlying assumptions are that: (a) a schema germane to road traffic situations is somewhat malleable, and (b) positive social interactions mediate the appraisal of vulnerability and mistrust. Therefore, this thesis attempted to address the hypothesis that a dysfunctional or maladaptive schema is characterized by vigilance to vulnerability in road traffic situations. A dysfunctional or maladaptive schema specific to road traffic situations would likely be dominant in those MVA survivors with PTSD and might be associated with the maintenance of PTSD symptomatology. Further, this thesis attempted to explore the effects of positive, helpful, or beneficial social interactions on the perception of threat or vulnerability

specific to road traffic situations.

The intent of the following review of the literature is to provide some understanding of PTSD in MVA survivors and provide a basis for the study's hypotheses. The section on prevalence is meant to underscore the importance of research in MVA survivors. The sections on comorbidity, risk factors in the development of PTSD, and avoidance and intrusion provide additional information as well as rationale for MVRs. Few studies have examined the role of social interactions in PTSD, in particular PTSD in MVA survivors. However, a number of researchers (Joiner & Coyne, 1999) have studied interpersonal processes in depression. Given the comorbidity of depression in PTSD, the role of social interactions reported in both PTSD and depression will be reviewed. The final sections explore schemas as defined by Beck et al. (1979) and Young (1994) and provide a framework for a schema, including social interactional influences on the schema, germane to MVA survivors.

Literature Review

Prevalence of PTSD

Of those exposed to traumatic events, only some develop PTSD. Reported lifetime prevalence rates of PTSD in community samples have ranged from 1% to 9% (Breslau, Davis, Andreski, & Peterson, 1991; Davidson, Hughes, Blazer & George, 1991; Helzer, Robins, & McEvoy, 1987). Prevalence rates of PTSD following exposure to specific stressors, including sexual assault, physical assault, and MVAs, have been higher than the population norms and have ranged from 13% to 25% (Breslau et al., 1991; Feinstein & Dolan, 1991; Norris, 1992). Some variability in PTSD prevalence rates may be attributed to the use of different PTSD assessment interviews and measures (Davidson et al., 1991; Honig, Grace, Lindy, & Titchener, 1999) or differences in diagnostic criteria (Blanchard, Hickling, Taylor, & Loos, 1995). In addition, reported prevalence rates following exposure to potentially traumatic events may underestimate prevalence. For example, undiagnosed PTSD was found in 17% of a group of combat soldiers who had not exhibited symptoms (Z. Solomon, 1987). In another study conducted by M. M. Green et al. (1993), 25% of a sample of MVA survivors remained undiagnosed 18 months post-MVA despite the presence of early symptomatology. Further, those with severe PTSD may refuse

to participate in research and thereby may be excluded from reported prevalence rates (M. M. Green et al., 1993).

Whereas PTSD may have less severe consequences on occupational or social functioning than do some forms of psychiatric disorders, PTSD is much more common in the general population than either schizophrenia or bipolar disorder, both of which have lifetime prevalence rates of less than 2% (APA, 1994a). The 9% lifetime prevalence rate for PTSD reported by Breslau et al. (1991) is higher than the lifetime prevalence rates reported in DSM-IV (APA, 1994a) for most other psychiatric disorders. The even higher rates of PTSS (20% to 23%) and PTSD (11% to 46%) reported in previous studies of MVA survivors (Blanchard et al., 1994; Kuch et al., 1994; Mayou et al., 1993) emphasize the need for further research.

Prevalence rates indicate that only some of those exposed to traumatic events develop PTSS or PTSD. This suggests that MVA survivors who develop PTSD may cognitively process the event in a way that differs from those who do not develop PTSD. Although most of those exposed to traumatic events probably re-evaluate many fundamental schemas such as rightfulness and safety, only some perceive themselves as highly vulnerable to threatening stimuli (Blanchard & Hickling, 1997).

Comorbidity

Complicating our understanding of PTSD is the fact that comorbidity with other psychiatric disorders is fairly common. For instance, a study of a large community sample (Helzer et al., 1987) found that those with PTSD were twice as likely as those without PTSD to have another psychiatric disorder. In a similar sample, Breslau et al. (1991) reported a number of additional psychiatric disorders found in those with PTSD including: (a) major depression (37%), (b) drug abuse (22%), (c) alcohol abuse (43%), and (d) any substance abuse (43%).

Comorbidity with PTSD is also common in MVA survivors. Hickling et al. (1992) found that 70% of the MVA survivors in their study suffered from a diagnosable mood disorder. Rates of major depression for MVA survivors vary from 42% (Kuch, Cox, & Dorenfeld, 1995) to 53% (Blanchard, Hickling, Taylor, & Loos, 1995). In addition to comorbid major depression, a number of participants in a study of recent (1 to 4 months) MVA survivors (Blanchard, Hickling, Taylor, & Loos, 1995) met criteria for a variety of diagnosable Axis I disorders (i.e., other anxiety

disorders, current alcohol abuse, etc.) or Axis II disorders (i.e., borderline personality, avoidant personality disorder, etc.). Early comorbid major depression appears to be a predictor of PTSS 6 months post-MVA (Blanchard et al., 1997). In addition, depression and PTSD appear to be distinct responses to trauma in MVA survivors (Blanchard, Buckley, Hickling, & Taylor, 1998). Comorbid depression should be of concern because MVA survivors with PTSD and depression have been found to evidence more adjustment problems than do MVA survivors with only PTSD (Blanchard, Buckley, et al., 1998).

Taylor and Koch (1995) have noted a high incidence of comorbid pain, as well as comorbid depression, in MVA survivors referred for psychological treatment. According to Koch (1993), chronic pain is a predisposing factor for PTSD in MVA survivors. Therefore, pain arising from injuries sustained in MVAs should also be of concern in MVA survivors, particularly those with PTSD.

In a laboratory study, Arntz, Dreessen, and Merckelbach (1991) demonstrated that focusing on pain stimulation increases subjective pain ratings as well as physiological responses (i.e., skin conductance, heart rate) to pain stimuli. Shalev, Belich, and Ursano (1990) also found that, even when compared to combat veterans without PTSD on physical examinations and laboratory tests, combat veterans with PTSD attend more to physiological status and physiological cues. Consequently, they report more accurate and more numerous physical symptoms. It is possible that MVA survivors who sustain injuries that interfere with mobility and functioning (e.g., social, occupational), particularly those who develop PTSD (criterion F subsumes impaired functioning), have a great deal of time to attend to pain as well as other physiological reactivity.

Pain may also be problematic in MVA survivors, especially those with PTSD, because depression is common in those with chronic pain (Sullivan, Reesor, Mikail, & Fisher, 1992). For example, a review article by Sullivan et al. (1992) reported that the prevalence of major depression in patients with chronic low back pain is three to four times greater than that found in the general population. In addition, Sullivan and D'Eon (1990) found mild to severe depression in 79% of their sample of patients referred to a chronic pain clinic. In that study, pain severity predicted depression. Catastrophizing was also significantly related to subjective pain ratings. Similarly, in a recent study of patients who developed chronic pain subsequent to accidental injury

at work or in an MVA, catastrophizing was correlated with depression, pain, anxiety, perceived disability, and unemployment (Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998). Catastrophizing is a mental template for how to interpret pain. A schema specific to pain may mediate the experience of pain in individuals who catastrophize (Sullivan, Rouse, Bishop, & Johnston, 1997). Based on the findings reported by Sullivan and D'Eon (1990), different conditions appear to change the set of cognitions or the mental template for pain interpretation. Talking about pain experiences reduces attention to pain and pain-related intrusive cognitions (Sullivan et al., 1998). A study conducted by Lawson, Reesor, Keefe, and Turner (1990) further suggests that cognitive processes such as distraction and reinterpretation of stimuli are frequently used strategies for coping in individuals with chronic pain. Similarly, a review of research studies by Hanson and Gerber (1994) indicates that cognitive processes may be an underlying factor for the depression and high distress levels so commonly found in those with chronic pain and perceived disability. Consequently, injured MVA survivors who report high levels of subjective pain, develop chronic pain, or both, may be at even higher risk for depression than other survivors of MVAs or other traumatic experiences who have dissimilar pain experiences.

Blanchard and Hickling (1997) have noted the similarities in symptomatology for depression and PTSD (i.e., psychological numbing, criterion C). Those similarities, as well as the high rates of comorbid depression in PTSD, led Blanchard and Hickling (1997) to recognize the relevance of cognitive processes, particularly schema and distorted cognitions, in MVA survivors with PTSD.

Comorbidity is highly relevant to the study of cognitive processes in individuals who have experienced a traumatic MVA. First, given the source of the trauma, as well as the relationship between chronic pain and depression, many traumatized MVA survivors might be expected to report some symptomatology. Second, pain, disability, and depression, as well as any associated social and occupational disruptions arising from a traumatic MVA, may inadvertently heighten the perception of vulnerability experienced by some MVA survivors. The appraisals of pain, disability, and depression may themselves be filtered through a mental template adapted for screening threatening stimuli related to the traumatic MVA. Any increased awareness or catastrophization

of symptomatology might further bias the appraisal of vulnerability specific to road traffic situations.

Risk Factors in the Development of PTSD

Another approach to understanding PTSD is the examination of data pertaining to associated risk factors. A number of factors such as: (a) exposure to traumatic events (Breslau, Davis, & Andreski, 1995), (b) perceived threat and injury severity (Kilpatrick et al., 1989; Malt et al., 1993), (c) family and personal history (Davidson et al., 1991), (d) avoidance and intrusion (McFarlane 1988), and (e) acute stress disorder (Harvey & Bryant, 1998b) have been implicated in the development of PTSD. This section will focus on research concerning those factors in the development of PTSD in MVA survivors.

Exposure to Traumatic Events

Exposure to a traumatic event is the primary criterion in the diagnosis of PTSD. In studies of community samples by Breslau et al. (1991) and Norris (1992), 39% to 69%, respectively, of those surveyed reported exposure to at least one lifetime traumatic event. The most frequently experienced traumatic events reported in those studies included: (a) assault, rape or intimidation, and (b) serious injury, accident, or death (including witnessing or notification of the event). In the Breslau et al. (1995) study, more men than women reported witnessing serious injury or death, whereas more women than men reported notification of such events. Those who were well-educated or married were less likely than others to report exposure to traumatic events. Further, those who admitted to past exposure to traumatic events at baseline (i.e., in Breslau et al., 1991) were twice as prone as non-exposed subjects to experience exposure to subsequent traumatic events (Breslau et al., 1995).

Several other factors may be more specifically linked to elevated exposure rates for MVAs. According to Berger (1975), those factors include: (a) lack of driving experience in new drivers; (b) increased age and shortened reaction times in elderly drivers; (c) limited familiarity with the vehicle, routes, and point of destination; (d) specific weather conditions; (e) driving under the influence of alcohol, illicit drugs, or certain medications (i.e., contraindicated for use when driving); and (f) specific medical or mental conditions. In addition, there is growing concern about the role of sleep deficit and sleep deprivation in MVAs (Coren, 1996).

The experience of a traumatic event is central to the development of PTSD. Certain lifestyle choices place some individuals at higher risk than others for exposure to specific traumatic events such as MVAs. However, risk factors are not definitive explanations. Exploration of the underlying mechanisms that may increase the risk of experiencing an MVA may also provide some understanding of fundamental processes associated with the development of PTSD as well as insight into risk appraisals and the development of adaptive or maladaptive cognitive templates in MVA survivors.

Perceived Life Threat and Severity of Injury

The combination of perceived life threat and physical injury may be an important factor in the development of PTSD. For instance, Kilpatrick et al. (1989) found that victims of crime who feared for their lives and who also sustained physical injury during the course of the event were three times more likely to develop PTSD than were other crime victims.

Factors specific to the development of PTSD in MVA survivors have only recently been investigated. However, many MVA survivors share similarities with those in the Kilpatrick et al. (1989) study and may therefore face the same increased risk of developing PTSD. For example, Blanchard et al. (1996) found that fear of dying predicted the development of PTSS in a sample of MVA survivors. Similarly, perceived life threat predicted the development of PTSD in a study by Ehlers et al. (1998).

The relationship between injury severity and the development of PTSD remains unclear. Whereas some studies have found a relationship between injury severity and the development of PTSD in MVA survivors (Blanchard et al., 1996; Malt et al., 1993), others have found no such relationship (Feinstein & Dolan, 1991; Mayou et al., 1993). Objectively assessed injury severity and *perceived* injury severity appear to be poorly correlated (Bryant & Harvey, 1995), perhaps because injury severity measures do not take into account the subjective experience and the underlying cognitive processes that may exacerbate even seemingly minor symptoms or attenuate distress following major injury (Pilowsky, 1991). For instance, whiplash, despite its low score on accident injury severity measures, was a significant predictor of PTSS in studies by Blanchard et al. (1996) and Ehlers et al. (1998). The study conducted by Ehlers et al. (1998) also found that ongoing health problems associated with MVA injury, not injury severity per se, predicted PTSD

in a large sample ($N = 781$) of MVA survivors. However, Blanchard et al. (1997) found that both the severity of injury and the extent of ongoing problems associated with MVA injury predicted PTSD status at 6-month follow-up. Other researchers have found a relationship between subjective distress and PTSD but no relationship between injury severity and PTSD (Blanchard, Hickling, Taylor, & Loos, 1995; Feinstein & Dolan, 1991; Koren, Arnon, & Klein, 1999). Those findings highlight the importance of perceived versus actual severity of the MVA and its immediate aftermath in the development of PTSS and PTSD (Blanchard, Hickling, Mitnick, et al., 1995).

Life threat, injury severity, and ongoing problems associated with injury appear to play a role in the development of PTSD. According to Blanchard and Hickling (1997, p. 261), these threats to personal integrity and survival can be linked to “salient cognitions and memories”. This implies that, as suggested by Pilowsky (1991), cognitive processes play a role in the experiencing of a traumatic event.

Family and Personal History

Family history may act as a buffer or catalyst in the development of PTSD. For example, some Vietnam veterans have adjusted well despite a history of family instability (Hendin & Haas, 1984). However, Davidson et al. (1985) found a history of family psychopathology, most commonly alcoholism, depression, and anxiety, in 66% of their sample of patients diagnosed with chronic PTSD. In addition, Breslau et al., (1995) found that: (a) family history of psychiatric illness increased the risk of exposure to childhood trauma; (b) childhood trauma increased the risk of exposure to traumatic experiences in adulthood; and (c) exposure to a traumatic event increased the risk of subsequent exposure. Family history may play an indirect role in the development of PTSD by increasing the likelihood of exposure and subsequent re-exposure to traumatic events (Breslau et al., 1995).

Studies of MVA survivors suggest a more direct link between previous psychiatric history and PTSD. For instance, Hickling et al. (1992) found a previous history of a diagnosable disorder in 33% of those who developed PTSD. Similarly, in a study by Blanchard, Hickling, Taylor and Loos (1995), 50% of recent MVA survivors who developed PTSD reported a previous history of major depression whereas 25% of those who developed PTSD or PTSS reported a previous

history of PTSD.

Patterns of social interaction and characterological tendencies in response to threat or extreme trauma, as suggested by this data, as well as other factors such as perception of life threat and injury severity, may play a role in the manifestation of PTSD. Young (1999) has postulated that early life experiences and re-appraisal of stimuli determine the later perception and experience of life situations. As noted by Blanchard and Hickling (1997), some of the symptoms of PTSD closely resemble those of other disorders, particularly depression, that have been commonly found to have been present in those with PTSD, their families, or both, prior to the traumatic event. The symptoms of depression reflect a style of perceiving and evaluating relationships and experiences, in other words, a cognitive process (Beck et al., 1979). Further, based on clinical observations of interactional styles, Blanchard and Hickling (1997) view beneficial or positive social interactions as crucial to the resolution of PTSD in MVA survivors. This suggests that investigations focusing on the association between social interactions and cognitive processes may be important contributions to our understanding of PTSD in those who have survived traumatic MVAs.

Avoidance and Intrusion

Specific cognitions and behavior patterns are cardinal features of PTSD. The findings of a recent study of MVA survivors conducted by Taylor, Koch, Kuch, Crockett, & Passey (1998) suggest that the DSM-IV (APA, 1994a) symptoms of PTSD form a two-factor structure. The first factor loads on intrusions or avoidance. The second factor loads on hyperarousal or numbing. Taylor et al. (1998) believe that “specific mechanisms” contribute to these two factors, but have not elaborated further.

Avoidance and intrusion, diagnostic criteria for PTSD, have also been identified as risk factors in the development of PTSD (Feinstein & Dolan, 1991; McFarlane, 1992a). Manifestations of avoidance include taking steps to prevent exposure to stimuli (e.g., people, places, activities, situations, feelings, memories, physiological sensations) associated with the traumatic event. Consequently, measures taken to prevent re-exposure to those stimuli may be behavioral, affective, or cognitive in nature. Intrusion consists of unwanted and distressing thoughts, images (including dreams), or feelings which are associated with the traumatic event. According to Beck et al. (1979, 1985), an individual accesses specific schemas when filtering

incoming stimuli and determining responses to the stimuli. For that reason, intrusive stimuli and avoidant responses are highly relevant to the investigation of cognitive processes in MVA survivors.

Intrusion is common in those who experience traumatic events (Bryant & Harvey, 1998; Warda & Bryant, 1998a) and may even be a necessary process through which a traumatic event can be reviewed and reappraised (Ehlers, 1995). The presence of intrusion in the immediate aftermath of a traumatic event does not itself predict later psychopathology (Bryant & Harvey, 1998). However, McFarlane (1992a) found that high levels of intrusion reported by a sample of firefighters 4 months after the traumatic event predicted a number of psychiatric disorders, including PTSD, diagnosed 42 months after the initial trauma. The negative effects of highly distressing intrusion have also been reported in MVA survivors. For example, Mayou et al., (1993) found that highly distressing intrusions reported by MVA survivors soon after the accident (1 to 41 days) predicted the presence of psychiatric disorder (including PTSD) at 1-year follow-up. Another study conducted by Feinstein and Dolan (1991) found high intrusion and avoidance during the first week post-accident were the best predictors of PTSD at 6 months.

A number of factors appear to affect the course of intrusion and avoidance. For example, hospitalization following a brief intensive stressor may focus attention on the trauma during the first few days following a traumatic event, thereby maintaining or increasing intrusion levels (Shalev Orr, Peri, Schreiber, & Pitman, 1992). Medications, limited information concerning the event, and maladaptive coping strategies (e.g., dissociation) may also contribute to low levels of avoidance post-trauma and may explain an eventual increase in avoidance (McFarlane, 1992b). Whereas injury severity appears to be unrelated to intrusion and avoidance in MVA survivors (Bryant & Harvey, 1996), the extent of exposure to a stressor, as well as the degree of personal property loss (e.g., loss of home) was related to intrusion levels in a sample of firefighters studied by McFarlane (1992a). In addition, time-related increases in avoidance and decreases in intrusion have been reported by Shalev et al., (1992) for a group of survivors of a terrorist attack. Similarly, a number of studies (Blanchard, Hickling, Vollmer, et al., 1995; Brom, Kleber and Hofman, 1993; Feinstein & Dolan, 1991) have shown that both avoidance and intrusion reported by MVA survivors decrease over time ranging from 6 weeks to 6 months. Nevertheless, even

though intrusion may decrease over time, intrusion may remain problematic long after the stressful event (McNally, English, & Lipke, 1993).

Furthermore, the experience of avoidance and intrusion may be different in MVA survivors and survivors of other traumatic events. For example, in a recent study conducted by Dougall, Craig, and Baum (1999), intrusion levels (including ratings of unpredictability and uncontrollability) reported by MVA survivors were higher than those reported by both emergency workers (involved in the aftermath of a plane crash) and hurricane survivors. Intrusion levels decreased in MVA survivors during the first 3-month period following the accident and were fairly stable during the following 9 months. In contrast, intrusion levels continued to decrease over a longer period of time (i.e., 6 months) in those who had experienced other trauma such as exposure to a crash site or a hurricane.

Some potential mechanisms underlying avoidance and intrusion in MVA survivors have only recently been investigated. Those MVA survivors whose visual imagery skills were highly developed prior to the MVA may be at risk for PTSD because they repeatedly re-experience the trauma through flashbacks, nightmares, or both (Bryant & Harvey, 1996). Intrusive thoughts may also be problematic because they may trigger images of the crash and its sequelae. In a recent study conducted by Harvey and Bryant (1998a), most recent MVA survivors reported difficulty in suppressing MVA-related thoughts when requested to do so in the research setting. However, for highly distressed MVA survivors, an avoidance-intrusion cycle developed wherein intrusive recollections promoted cognitive avoidance and cognitive avoidance increased intrusive recollections. Such a cycle potentially increases distress and explains how early avoidance and intrusion may contribute to the development of PTSD.

Avoidance and intrusion may also interfere with reports of symptomatology and recognition of distress, thereby rendering diagnosis of PTSD more difficult. For instance, McFarlane (1986) found that avoidance was a contributing factor in cases of undiagnosed PTSD in a sample of disaster survivors. PTSD often goes undiagnosed in MVA survivors (Dinnen, 1994; Epstein, 1993; M. M. Green et al., 1993), in part because they avoid talking about the accident and deny the presence of symptoms (Epstein, 1993; M. M. Green et al., 1993). A recent study by Honig et al. (1999) also raises concerns regarding the assessment of PTSD. For example, some types of

clinical interviews may be more sensitive than others in detecting symptoms of avoidance and numbing. A recent study of flood survivors by Honig et al. (1999) demonstrated that a psychodynamic clinical interview elicited symptomatology that had not been detected by a more structured clinical interview (i.e., Structured Clinical Interview for DSM-III-R). Similarly, Blanchard, Hickling, Vollmer, et al. (1995) demonstrated that the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979; Zilberg, Weiss, & Horowitz, 1982) was not sensitive to changes (over time) in avoidance and intrusion in a sample of MVA survivors. Those findings support Meichenbaum's (1994) recommendation for the assessment of PTSD through the use of a number of different assessment tools (e.g., interview, self-report measures).

Avoidance and intrusion appear to play a critical role in the development, diagnosis, and maintenance of PTSD in MVA survivors. Blanchard and Hickling (1997, p. 279) have described avoidance as "a normal effort at adaptation that unfortunately has the effect (as explained by learning theory) of worsening, rather than improving, the PTSD symptoms" of MVA survivors. Part of their treatment protocol is the development of an "avoidance hierarchy" (p. 284), exposure and cognitive reappraisal. Intrusive thoughts and dreams are experienced more frequently by MVA survivors with PTSD than those with PTSS or without PTSD. Intrusion may be a mechanism for reprocessing the event. The goal of cognitive therapy in MVA survivors, according to Blanchard and Hickling (1997, p. 243) is "to help the patient access, and thereby confront, as many parts of the cognitive network of difficult memories as possible, making the memories conscious and salient, rather than allowing the patient to avoid them". This implies not only that cognitive processes maintain intrusion and promote avoidance, but also that cognitive content in this population can be accessed, challenged, and reprocessed.

Acute Stress Disorder

Acute stress disorder (ASD), introduced in DSM-IV (APA, 1994a), has also been implicated in the development of PTSD (Harvey & Bryant, 1998). The symptoms of ASD resemble those of PTSD. The diagnostic criteria for ASD include dissociation (e.g., numbing, detachment, reduced awareness, derealization), re-experiencing of the trauma, avoidance, and arousal. The symptoms must cause distress or impair functioning. Duration is a minimum of 2 days and a maximum of 4 weeks, with onset occurring within 4 weeks of the traumatic event. The

initial responses to potentially noxious stimuli such as an MVA are highly relevant because they may be important indicators of cognitive processes implicated in the adjustment of MVA survivors.

A recent study conducted by Harvey and Bryant (1998a) found that 14% of a sample of injured MVA survivors met the criteria for ASD. Another 20% of the sample reported many symptoms but failed to meet one of the criteria (i.e., avoidance, dissociation, or re-experiencing) for ASD. When reassessed 6 months post-MVA, 78% of those initially diagnosed with ASD met the criteria for PTSD. Sixty percent of those initially found to have subclinical ASD met the criteria for PTSD and another 20% met the classification of PTSS at 6 months. Of those who had neither ASD nor subclinical ASD at the time of the first assessment, few met the criteria for either PTSD (4%) or PTSS (8%) at 6-month follow-up.

Prior to the introduction of ASD, a study conducted by Koren et al. (1999) explored the relationship between “acute stress responses”, including PTSD symptomatology, and PTSD. For MVA survivors who were diagnosed with PTSD at 1 year, symptoms of PTSD, including intrusion and avoidance, as well as general physical and psychological distress: (a) were higher than others at the time of the initial assessment (1 to 7 days); and (b) increased from the time of the first assessment to the time of the third assessment (at 3 months). Symptomatology at 3 months predicted PTSD at 1 year.

A specific MVRs may underlie the heightened distress reported by some MVA survivors, particularly those who develop ASD. In a recent study conducted by Warda and Bryant (1998a), MVA survivors with ASD overestimated the likelihood of experiencing various negative events as well as perceived negative outcome of each of those possible events. Furthermore, avoidance predicted both exaggerated likelihood and estimations of negative outcomes.

Acute distress following an MVA, whether construed as intrusion and avoidance or diagnosed as ASD and subclinical ASD appears to be an important factor in the development of PTSD. Yet, we know little about cognitive processes that may mitigate acute distress or social interactions that may impact on cognitive content.

Social Interactional Influences

Direct (e.g., with friends, family, etc.) and indirect (e.g., media, etc.) social interactions potentially affect and modify the perceptions, actions, emotions, and cognitions of those involved in a traumatic or potentially traumatic event. Social interactions such as loving, caring, listening, providing practical help, and giving information are usually perceived as beneficial influences and have often been referred to as social support. Social support, as defined in the various research studies on PTSD, usually refers to beneficial social interactions. However, social interactions are not always beneficial. In fact, social interactions may be unhealthy and dysfunctional if the outcome is the promotion and maintenance of unhealthy, inappropriate, or maladaptive perceptions, actions, emotions, or cognitions.

A perceived paucity of beneficial social interactions may play a role in the development and maintenance of PTSD. For example, in a community sample, Davidson et al. (1991) found that those with PTSD reported lower levels of beneficial social interactions than did those without PTSD. Similarly, Vietnam veterans with PTSD reported lower levels of beneficial social interactions than Vietnam veterans without PTSD (M. A. Green & Berlin, 1987). In addition, Z. Solomon, Mikulincer, and Avitzur (1988) found that veterans who reported more intense PTSD also reported lower levels of beneficial social interactions than did those with less intense PTSD. Research suggests that beneficial social interactions in the wake of exposure to a traumatic event buffers posttrauma anxiety and depression (Joseph, Andrews, Williams & Yule, 1992). In a recent study of MVA survivors, beneficial social interactions were found to be negatively related to both anxiety and depression, and also to intrusion (Warda & Bryant, 1998b). Further, beneficial social interactions may promote acceptance of injuries and overall adjustment following a traumatic experience (Khamis, 1993).

Research has demonstrated that the presence of close (i.e., family, friends) relationships and the degree of social involvement (i.e., church or club participation) are negatively correlated with psychiatric impairment (Romans, Walton, Herbison, & Mullen, 1992; Warheit, 1979). Social relationships are the foundation of the social interactional network that is critical for well-being following a traumatic event (G. Andrews, Tennant, Hewson, & Vaillant, 1978). For instance, Frye and Stockton (1982) found that Vietnam veterans who developed PTSD generally had not

discussed their war experiences with their families. Similarly, the perceived quality of family relationships predicted PTSS at 6-month follow-up in a sample of MVA survivors (Blanchard et al., 1997). However, support availability may not be enough. Actively seeking beneficial social interactions has been shown to protect against increases in symptomatology following exposure to additional negative life events (Z. Solomon, Mikulincer, & Flum, 1988). According to Henderson (1981), the *perception* (of quality and quantity) of beneficial social interactions is more important than *actual* beneficial social interactions for psychological well-being, and perceived beneficial social interactions appears to be particularly important for the psychological well-being of those who experience highly traumatic events. Supporting this, a study by Z. Solomon, Waysman, and Mikulincer (1990) indicated that perceived connectedness to others and perceived family beneficial social interactions appeared to buffer the development of PTSD symptomatology in a sample exposed to an environmental disaster.

The role of beneficial social interactions in the development and maintenance of depression is also important because depression is common in PTSD. Perceived connectedness to social interactional networks (B. Andrews & Brown, 1988; Brown, Andrews, Harris, Adler, & Bridge, 1986) as well as quality and quantity of beneficial social interactions (Billings & Moos, 1984), appear to have a buffering effect on depression.

Although some research has examined the role of beneficial social interactions in the aftermath of traumatic events, there exists little research concerning the effects of others requesting beneficial social interactions from trauma survivors. However, a study by S. D. Solomon, Smith, Robins, and Fishbach (1987) found that moderate levels of social interactional burdens appeared to have a buffering effect for survivors of a natural disaster. Level of connectedness affected social interactional burden. Male survivors who reported close marital relationships reported less symptomatology than others, whereas women who reported close marital relationships actually fared worse than others. It may be that women who receive high levels of beneficial social interactions perceive an implicit obligation to reciprocate, thereby increasing their social interactional burden (S. D. Solomon et al., 1987). For women, moderate levels of perceived beneficial social interactions as well as moderate social interactional burdens may be optimum for psychological well-being (S. D. Solomon et al., 1987). The S. D. Solomon et

al. (1987) study did not address the fact that many women are the primary caretakers in the family. Women “may disproportionately take on responsibility for others” (Lyons, Mickleson, Sullivan, & Coyne, 1998). For that reason, the demands of caring roles may not only appear, but may actually be, more burdensome for women who experience additional stressors. In the case of MVA survivors, the demands of caring roles may be increased by physical injuries sustained by others in the family and rendered more onerous by physical or emotional injuries sustained by the caretakers themselves. In addition to increased social interactional burdens, survivors of MVAs who act as primary caretakers may also perceive less adequate beneficial social interactions because those who would usually provide care and concern are themselves preoccupied with losses, injuries, or both.

There is scant information regarding the effects of social interactions on the development and maintenance of PTSD, particularly in MVA survivors. However, the recent finding by Warda and Bryant (1998b) that beneficial social interactions are negatively related to intrusion supports the earlier observations of Blanchard and Hickling (1997) that social interactions mediate the course of PTSD in MVA survivors.

Conceptualization of PTSD in MVA Survivors

Fear, Anxiety, and Schemas: A Cognitive Perspective

Fear and Anxiety

A recent study conducted by Ehlers et al. (1998) highlights the relevance of fear and anxiety in MVA survivors. The findings suggested that a number of cognitive factors predicted and maintained PTSD. Those factors included: (a) perceived threat during the MVA; (b) intrusive recollections of the MVA accompanied by self-statements expressed as the imminent loss of sanity and the improbability of resolution (i.e., of the MVA and its sequelae); (c) initial anger and frequency of intrusive recollections accompanied by anger formulated as harm inflicted by others; and (d) intrusive recollections accompanied by brooding, questioning “why did it happen to me” (p. 511), and thought suppression. As noted by Ehlers et al. (1998),

negative interpretations of intrusions and anger cognitions directly lead to the perception of threat and prevent the patient from seeing the trauma as an isolated negative event in the

past. Rumination probably prevents a change in the nature of the trauma memory and may, like thought suppression, also increase the frequency of reliving symptoms directly. (p. 517)

Other factors in the Ehlers et al. (1998) study that predicted and maintained PTSD in the sample of MVA survivors included ongoing health and financial problems arising subsequent to traumatic MVA. These factors may: (a) generate and maintain fear and anxiety related specifically to health and financial status; (b) act as triggers for MVA-related anxiety; and (c) interfere with cognitive processes conducive to recovery from traumatic MVA. Simply stated, these six predictor and maintenance factors found by Ehlers et al. (1998) all have to do with fear, anxiety, and, ultimately, vulnerability.

Therefore, an understanding or conceptualization of fear and anxiety appears to be highly relevant to the conceptualization of PTSD in MVA survivors. Beck et al. (1985) have provided a conceptualization of fear and anxiety that represents one approach which may be useful in understanding the underlying cognitive processes that lead to the development, maintenance, or exacerbation of PTSD. One of the advantages of this model is that it is embedded in a clinically-based therapeutic framework which is useful in addressing problems such as fear, anxiety, and depression.

Although the words fear and anxiety are frequently used interchangeably, they are distinct processes. Fear, as described by Beck et al. (1985), is a cognitive process, an appraisal of threat, vulnerability, or danger. Anxiety is an emotional process or response to fear. Anxiety is a normal, albeit uncomfortable or distressing, emotional response to a fear-eliciting stimulus. Anxiety is a signal that some sort of self-protective action or reaction should take place, a prompt for danger and fear reduction.

Beck et al. (1985) have described the three main responses to anxiety- "mobilization, inhibition, demobilization" (p. 25). The first response involves fight or flight, an active defensive or withdrawal stance. The cognitive response is one of hypervigilance. It may feature automatic thoughts and images of threatening stimuli. Physiological responses include increased heart rate, respiratory rate, and muscle tension. Affective responses may include apprehension or horror. Restlessness and pacing are behavioral manifestations of a mobilizing response to anxiety. Inhibition involves a "freezing" (p. 25) process, manifested by cognitive difficulties (e.g.,

concentration, reasoning) and behavioral constriction (e.g., muscular rigidity, clumsiness). Demobilization, essentially an overreaction to anxiety, a reactive shutting down of all processes (e.g., physical, cognitive), is marked by physical slumping or fainting. Demobilization is a response signaling helplessness in the face of overwhelming fear and anxiety.

The automatic responses to anxiety stop when the threat is removed or evaded. However, under conditions of prolonged exposure (i.e., to threatening stimuli) or overwhelming fear, the automatic responses to anxiety may not shut down. Thus the individual remains in a state of high alert. Anxiety does not dissipate even though the threat decreases or the danger passes. As the individual continues to exhibit cognitive, affective, behavioral, and physiological responses to a feared stimulus which is no longer a threat, anxiety becomes pathological. Continuous scanning of the environment for threat and danger, as well as related automatic thoughts, images, or both, maintain the state of alert and interfere with the evaluation of risk. Consequently, highly anxious individuals tend to: (a) perceive anything which is not unequivocally safe as dangerous; (b) overestimate the probability of harmful outcomes; (c) overestimate the impact of imagined harmful outcomes; (d) focus on negative and fear-eliciting stimuli; (e) perceive themselves as highly vulnerable; (f) over time, develop fear, anxiety, thoughts or images concerning a number of stimuli (e.g., people, places, objects) which are somewhat connected to the original feared stimulus; and (g) exhibit increased arousal instead of habituation when repeatedly exposed to the feared stimulus. Anxiety per se is adaptive. However, overreliance on cognitive schemas or templates that interpret internal and external stimuli as threatening is maladaptive and dysfunctional.

The fear and anxiety responses described by Beck et al. (1985) are subsumed under the various diagnostic criteria for PTSD. Further, the clinical observations and investigations of Blanchard and Hickling (1997) provide support for the presence of hypervigilance, physiological arousal, and cognitive distortions in MVA survivors with PTSD.

Schemas

The model proposed by Beck et al. (1985) also elaborates on the role of cognitive schemas in the acceleration of threat appraisal and harm avoidance. Schemas are hypothetical mental constructs or templates which form the framework for filtering, assimilating, and integrating

internal and external stimuli. Schema content is organized around specific categories or themes. Whereas some schemas may be fairly circumscribed, allowing us to define a simple object such as a hat, more elaborate schemas help us to define more complex constructs such as personal identity. The more complex schemas subsume beliefs, assumptions and rules for appraising and encoding information. When activated by internal or external stimuli, schemas selectively filter out irrelevant or inconsistent incoming information. Although schemas expedite the processing of stimuli, the selectivity of schemas, particularly those with high emotional content, may bias or distort incoming environmental or situational cues. For example, those with anxiety disorders perceive themselves as highly vulnerable and their environments as very dangerous. This perception or vulnerability schema thus becomes the overriding schema through which those with pathological anxiety access and evaluate information. The vulnerability schema is maintained through a feedback system wherein: (a) inexperience or past experience leads to maladaptive responses (e.g., fainting); (b) cognitive, physiological, affective, and behavioral responses trigger catastrophic predictions; (c) the additive effect of physiological, behavioral, affective, and cognitive responses impair performance; (d) impaired performance intensifies the physiological, behavioral, affective, and cognitive responses, as well as associated catastrophic predictions; (e) performance is further impaired; and (f) the sense of vulnerability is heightened. The vicious cycle can potentially be attenuated or exacerbated by responses from the social environment (especially social interactions) and by active reappraisal and modification of the cognitive templates for vulnerability.

Vulnerability

Beck et al. (1985) have postulated that vulnerability is the “core of anxiety disorders” (p. 67). Vulnerability is defined as self-perceived inadequacy for dealing with threatening stimuli and inability to insure personal or interpersonal integrity. Like anxiety, vulnerability in response to fear is not necessarily pathological and it can be highly adaptive in that it encourages withdrawal from dangerous situations. However, in anxiety disorders, vulnerability is problematic.

Vulnerability concerns threats to two specific domains. Whereas the “sociality domain” (Beck et al. 1985, p. 79) encompasses individual and group interactions (e.g., integration, acceptance, help), the “individuality domain” incorporates autonomy, mastery, health, and

survival. This conceptualization of vulnerability explains how threats to status and integration, bodily integrity and function, personal identity and significance might invoke highly efficient and rapid cognitive processing that excludes or minimizes all but the most relevant information. This selectivity means that the appraisal of threat and of resources (i.e., internal and external) for dealing with the threat may be biased unless a more active and deliberate reappraisal is undertaken. In pathological anxiety, an individual either does not initiate further cognitive processing or ignores incongruent information that might alter the initial appraisal. Therefore, the individual not only perceives but also reacts or overreacts to many fear-eliciting, anxiety-provoking stimuli embedded in core vulnerability domains.

Although Beck et al. (1985) present a cognitive perspective of many anxiety disorders (e.g., panic disorder, simple phobias), they provide little elaboration of PTSD. The sparse references to PTSD suggest that traumatic events involve vulnerability, a threat to survival. The effect of trauma is such that cognitive integration may not be feasible, in which case thoughts relevant to the traumatic experience are highly accessible “in the background of his thinking, easily activated by any relevant stimulus” (p. 89). Event-related cues may thus trigger unwanted images and subsequent re-experiencing of the traumatic event. The intensity of the anxiety elicited by the re-experiencing of the traumatic event may be equivalent to that experienced during the actual trauma. The “core problem in the traumatic neuroses” (p. 90) is one of cognitive discrimination and labeling. The traumatized individual experiences difficulty distinguishing between threatening and non-threatening stimuli because “thinking is dominated by a concept of danger” (p. 90). Consequently, even non-threatening stimuli may repeatedly be labeled as threatening until the label sticks. Cognitive processes and cognitive content for PTSD are not further elucidated.

Young’s (1999) concept of “early maladaptive schemas” is an extension of the work of Beck et al. (1985). Young (1999) construes early maladaptive schemas as basic or core schemas formed in early childhood. These early inflexible, dysfunctional, and emotionally charged schemas are potential precursors to psychological distress. Early maladaptive schemas are usually triggered by stimuli relevant to the specific schema content. Because the schemas are highly emotionally charged, triggers are often avoided. The schemas are maintained through the cognitive processing of congruent, substantiating information and the filtering out of incongruent, challenging

information. Although Young (1999) describes schemas and their relationship with various psychological disorders, he does not link PTSD to early maladaptive schemas. Nevertheless, two of the core schemas appear to be of particular interest in the study of PTSD.

The first schema of interest is that of “vulnerability to harm or illness” (Young, 1999, p. 13). Subsumed in this schema are expectations and fears related to calamities that threaten physical and emotional well-being and survival. This schema is associated with anxiety (Schmidt, Joiner, Young, & Telch, 1995). The second schema, reminiscent of the Beck et al. (1985) sociality vulnerability domain, is that of “mistrust/abuse” (Young, 1999, p. 12). The second schema incorporates the expectation of intentional harm, danger, and disconnection. According to Schmidt et al. (1995), this schema is associated with depression.

Blanchard and Hickling (1997) explore vulnerability through the development of fear hierarchies and the exploration of underlying cognitions during the course of treating MVA survivors with PTSD. Through what Blanchard and Hickling (1997, p. 285) describe as “perhaps the most difficult process”, they help “the patients discern what types of beliefs or images drive their emotional and behavioral responses” (p. 285). Those beliefs or images reflect fear related to personal and interpersonal integrity and survival.

Although cognitive models for some anxiety disorders have been conceptualized by Beck et al. (1985), and schema content relevant to core vulnerability has been elucidated by Young (1999), no model specific to PTSD exists. Therefore, based on the works of Beck et al. (1985) and Young (1999), this investigation will attempt to form a framework for examining the underlying cognitive processes in MVA survivors who develop PTSD.

Fear, Anxiety, and Vulnerability in MVA Survivors

MVA survivors are exposed to a potentially life-threatening, fear-eliciting, emotionally charged event. Extrapolating from the work of Beck et al. (1985), this type of stimulus would activate rapid-firing cognitive processing, a process that necessarily would filter out some or much of the details of the crash and focus attention on threatening stimuli. Specific stimulus conditions (e.g., inclement weather, substandard roads), MVA-related injuries (e.g., pain, bleeding wounds), new threats (e.g., fire, explosions), vehicular exposure (e.g., driving a damaged vehicle, transport to hospital via ambulance), and loss (e.g., loved ones, physical mobility, financial loss)

may all pose an ongoing actual or perceived danger to MVA survivors. The fear elicited by the MVA and MVA-related ongoing threats would activate anxiety. Although the anxiety responses would vary from one individual to another, they would most probably include many of the cognitive (e.g., hypervigilance, thoughts and images related to threatening stimuli, problems with recall and concentration), affective (e.g., impatience, nervousness), behavioral (e.g., muscular incoordination or rigidity, shaking, pacing, avoidance), and physiological (e.g., changes in heart and respiratory rates, increased reflex reactivity, perspiration, fainting) symptoms described by Beck et al. (1985). The symptomatology would validate and maintain fear and anxiety. Physical injury and pain not only produce symptoms (many of them similar to those of anxiety) of their own, but also potentially heighten the sense of vulnerability (i.e., threaten health and survival). The additive effects of physical injury and pain would further validate, maintain, and exacerbate fear, anxiety, and vulnerability.

In this investigation, as in Beck et al. (1985), vulnerability is defined as self-perceived inadequacy for dealing with threatening stimuli and inability to insure personal or interpersonal integrity. Personal vulnerability involves perceived threat to physical and emotional well-being and survival. Interpersonal vulnerability involves a perception of threat stemming from others such as physical or emotional harm, disconnection or exclusion. Whereas personal vulnerability subsumes autonomy, health, and survival, interpersonal vulnerability includes mutual acceptance, integration, and help. Implicit in vulnerability, is a certain mistrust of self and others to ensure safety, integrity, survival.

Blanchard and Hickling (1997) specifically address the symptoms of fear and anxiety in their treatment of MVA survivors with PTSD by involving significant others who may be able to provide additional information regarding the accident and promote involvement in safe and enjoyable social interactions. In addition, a rationale for the survivors' symptomatology is offered to significant others in an effort to foster acceptance or tolerance of the behaviors and other responses that developed subsequent to the traumatic MVA. The underlying assumption is that fear and anxiety are associated with the behaviors and other responses to the traumatic MVA. Further, increasing the levels of positive social interactions provides distraction from threatening stimuli as well as a sense of interpersonal connection. The premise here is that both positive or

beneficial social interactions mediate the appraisal of personal and interpersonal vulnerability and allow for the turning down or turning off of cognitive processes more suitable for high states of alert.

Schemas in MVA Survivors

According to Beck et al. (1985), stimuli that threaten personal or interpersonal integrity and survival activate highly focused and inflexible schemas that allow for expedient cognitive processing and subsequent rapid response. In cases of prolonged and overwhelming exposure to a threatening stimulus, cognitive, affective, behavioral, and physiological responses may not shut down. Thus cognitive processing may be largely reliant on danger schemas. Based on the literature review of previous research of MVA survivors, the distress reported by many MVA survivors suggests that, for many, the fear and anxiety responses relevant to an MVA and its sequelae remain active for quite some time.

Extrapolating from the work of Beck et al. (1985), one might expect that a highly traumatic MVA could challenge some of the implicit rules, assumptions, and beliefs by which MVA survivors live. Unless the fear-anxiety responses have been deactivated, any reassessment and revision of MVA-specific schema content would be processed through the superceding danger schema. Consequently, reappraisal, if it takes place at all, is likely to be biased towards an appraisal of danger. Further, with cognitive processing stuck on danger and vulnerability, integration of information relevant to the MVA would probably be limited. Thoughts and mental images concerning the MVA would then be expected to remain highly accessible and easily triggered by MVA cues. Increased fear, anxiety, and vulnerability would most likely ensue, intensifying symptomatology and guaranteeing a self-perpetuating cycle. The cycle would be difficult to interrupt because, given our reliance on motor vehicles, re-exposure to motor vehicles would be most probable. Avoidance of other potential MVA cues including pain and disability seems equally improbable. An uninterrupted self-perpetuating cycle of fear, avoidance, and vulnerability would eventually lead to some form of anxiety disorder, most probably PTSD.

There is some support for this study's conceptualization of PTSD in MVA survivors. Koch and Taylor (1995) advocate the provision of cognitive interventions that specifically address the assumptions that may underlie phobic avoidance of driving situations. They consider the

overestimation of vulnerability and the underestimation of safety as central to cognitive restructuring. This emphasizes the importance of addressing cognitive rules, assumptions, or beliefs and of indicating some general templates or schemas through which experiences may be filtered. This also argues for the importance of research trying to be more specific in identifying schema content, rules, assumptions, or beliefs. Whereas some experiences may underlie a specific fear or set of fears, other experiences may contribute to a broad set of fears (Taylor, 1998). Accordingly, this suggests that schema content may be either fairly narrow or quite broad in scope.

Core vulnerability and schema content. Whereas schema rules largely govern cognitive processing, the beliefs and assumptions subsumed in the schemas validate the core vulnerability (Beck et al., 1985). Core vulnerability may be expressed as anxiety, depression, or both (Beck, 1976). Core vulnerability and associated schema content germane to motor vehicles and the operation thereof has not previously been elaborated. Extrapolating from the work of Beck et al. (1985), core vulnerability could be expected to be related to motor vehicles and might be worded as “I’m defenseless in a motor vehicle”. Supporting beliefs and assumptions could be: (a) other drivers are inconsiderate, irresponsible, and dangerous; (b) roadways are dangerous; (c) laws offer no measure of safety or protection; and (d) if I travel in a motor vehicle I will be injured, disabled, or dead. This type of schema content would be dysfunctional and maladaptive because it potentially and almost certainly increases distress and promotes avoidance of situations involving motor vehicles and MVA-related cues.

There is some support for this conceptualization of core vulnerability and reflective schema content. Some of the thoughts expressed by MVA survivors with PTSD who were included in the treatment phase of the study conducted by Blanchard and Hickling (1997, p. 285) include: (a) “I’ve escaped being killed once, I won’t be so lucky a second time!”, (b) “I should have been able to somehow make a difference”, and (c) “I know what people are thinking, and they hold me responsible”.

In reporting on the treatment of MVA survivors with PTSD, Blanchard and Hickling (1997, p. 261) stated that “careful behavioral assessment and assessment of cognitive schema are essential if each individual is to have the optimal chance for improvement.” They advocate the use

of cognitive techniques, in particular cognitive restructuring in the treatment of MVA survivors with PTSD. Implicit in this treatment is the recognition of dysfunctional thoughts or cognitions. This implies that there is a cognitive process in MVA survivors with PTSD in which distorted or maladaptive cognitions may be the target of cognitive techniques. Another implicit assumption is that cognitive schemas do play a role in PTSD. Yet research has not systematically examined the content of a specific dysfunctional schema in MVA survivors with PTSD.

Cognitive Processes and Social Interactional Influences

Cognitive schemas play a role in: (a) anxiety disorders, including PTSD (Beck et al., 1985), (b) depression (Beck et al., 1979; Beck et al., 1985), and (c) pain (Hanson & Gerber, 1994; Lawson et al., 1990; Sullivan & D'Eon, 1990). Fear and anxiety have been shown to maintain PTSD symptomatology in MVA survivors (Ehlers et al., 1998). The schemas that determine the cognitive processing of fear and anxiety may not shut down subsequent to prolonged or overwhelming exposure to a threatening stimulus such as that required by the key criterion for PTSD. However, according to Beck et al. (1985), social interactions may fuel or interrupt the fear-anxiety cycle by validating or challenging the underlying schemas. Social interaction may similarly impact on depression and pain. Research supports the buffering role of beneficial social interactions in posttraumatic anxiety and depression (Joseph et al., 1992) and pain (Khamis, 1993).

Research has demonstrated that beneficial social interactions act as a buffer in the development of PTSD (Keane, Scott, Chavoya, Lamparski, & Fairbank, 1985) as well as in the development and maintenance of depression (Billings & Moos, 1984; G. Brown et al., 1986). Families may help those who have experienced traumatic events by: (a) recognizing signs of distress in the traumatized survivor; (b) encouraging reminiscence and discussion surrounding the traumatic event; (c) allowing for the presentation of facts previously unknown to the survivor; (d) providing an opportunity for the correction of any distortions of the facts; and (e) promoting the formation of new perspectives concerning the event (Figley, 1989). Extrapolating from Figley's (1989) recommendations, it could be expected that even simple measures to reduce distress (e.g., reducing speed, taking less threatening routes) could be beneficial to MVA survivors. Significant

others may also be enlisted to assist with cognitive-behavioral homework assigned in certain therapeutic protocols (Hickling & Blanchard, 1997).

Challenges to survivors' perceptions and recollections of the MVA and its aftermath may also encourage cognitive reappraisal and schema modification. A recent study conducted by Harvey, Bryant, and Dang (1998) suggests that contributing additional information and challenging cognitive distortions is beneficial for acutely distressed MVA survivors who may be experiencing difficulty with retrieval of positive pre-MVA memories and threatening MVA-related memories. This may be even more important for MVA survivors with depression who, compared to MVA survivors without depression, experience even more difficulty with memory retrieval (Harvey, Bryant, & Dang, 1998). In another recent study of MVA survivors conducted by Warda and Bryant (1998b), beneficial social interactions were negatively related to not only anxiety and depression, but also to intrusion. This suggests that beneficial social interactions may indeed impact on cognitive processing.

The social interactions of MVA survivors may also fuel anxiety. The social network (e.g., family, friends, co-workers) may react negatively to symptoms of anxiety, depression, or both. For example, a social network may exhibit critical, argumentative, or rejecting behaviors and perceptions (Coyne, 1999; Sacco, 1999). Such a reaction may negatively impact on the affect, behaviors, and perceptions of those with depression, anxiety, or both. Consequently, the social network may perceive depressed or anxious individuals as highly negative and psychologically disturbed. A corresponding increase in the negative affect, behaviors, and perceptions of those with depression or anxiety confirms, extends, and perpetuates social interactions that may foster dysfunctional and maladaptive schemas.

It is expected that, for MVA survivors with PTSD, negative social interactions may take the form of deliberately triggering anxiety by: (a) teasing about anxious behaviors, (b) driving by the accident site, or (c) making sudden moves while driving (e.g., jerking the car in one direction, braking suddenly). It is unlikely that social networks that exhibit highly critical or rejecting behaviors would validate small changes in behavior (e.g., occasional attempts at driving, small reductions in anxious behaviors) made by distressed MVA survivors or accommodate MVA survivors' needs for practical help. The social relationships of highly distressed MVA survivors

may be compromised because traumatic events themselves may color perceptions of interpersonal relationships (Aarts & Op den Velde, 1996) and pre-existing social relationship schemas may bias the interpretation of current beneficial social interactions (Yee, Santoro, Paul, & Rosenbaum, 1996). The maladaptive interrelationships of some distressed MVA survivors and their social networks may increase the risk for PTSS and PTSD by: (a) fueling fear and anxiety, (b) promoting expedient cognitive processing typically activated in the presence of threatening stimuli, and (c) discouraging cognitive reappraisal of schema content.

It is interesting to note that Blanchard and Hickling (1997) employ treatment techniques that encourage positive social interactions. For example, they encourage MVA survivors and significant others (e.g., spouse, close others) to plan regular positive interactions centered around enjoyable activities. Further, spouses or significant others are included and involved in the treatment process so that they can “at least minimally tolerate and understand” (p. 244) the symptoms that occur in MVA survivors with PTSD during exposure to road traffic situations. Blanchard and Hickling (1997, p. 244) not only view the “understanding and acceptance” of the symptomatology and “the thinking behind” it, but also the role of significant others “in the perpetuation and amelioration of the problem” as “critically important” in the treatment of MVA survivors with PTSD. Social interactions are considered so important that the treatment protocol includes working with MVA survivors and their significant others to bring about a change in social interactions. The aim is to promote “encouraging and positive” or “neutral” social interactions (p. 282). Yet, despite the perceived importance of beneficial social interactions in MVA survivors with PTSD, and the use of social interactions in therapeutic protocols, researchers have not investigated the effects of social interactions on the cognitive content of those who have survived traumatic MVAs.

Study Purpose and Objectives

This research attempted to identify and elucidate the underlying schema thought to be associated with PTSD symptomatology in MVA survivors. There were a variety of reasons for addressing this question. The prevalence rates that have been reported for PTSD in MVA survivors are high compared to that for other psychiatric disorders (Blanchard et al., 1994; Kuch et al., 1994; Mayou et al., 1993). Even though PTSD symptoms may have a significant impact on

functioning, PTSD symptomatology may remain unrecognized and unaddressed in the treatment and management of individuals (M. M. Green et al., 1993; Kuch, 1989; Honig et al., 1999). Although cognitive restructuring is an integral part of many treatment protocols for MVA survivors who develop PTSD (Blanchard & Hickling, 1997), previous investigations of MVA survivors have neither defined the content of mental templates specific to road traffic situations nor determined any differences in cognitive schemas associated with PTSD. There is some evidence that beneficial social interactions mediate cognitive processes associated with PTSD (Blanchard & Hickling, 1997; Harvey, Bryant & Dang, 1998; Warda & Bryant, 1998b), yet there are no data on how social interactions may influence schema content in MVA survivors who develop PTSD.

An understanding of the psychological processes, including social-cognitive processes, which may arise in MVA survivors who develop PTSD may impact on psychological intervention, treatment, or both. Thus Study 1 attempted to test the properties of an instrument designed to measure MVRS and determine if this could identify and measure schema content specific to the operation of motor vehicles and the inherent risks associated with motor vehicles. Therefore, the objective of Study 1 was to test a questionnaire designed to tap into motor vehicle-related schema and beliefs.

Study 2 basically attempted to address two questions: (a) whether those individuals who manifest PTSD post-MVA have a fundamentally different view of their vulnerability and their ability to trust others in road traffic situations; and (b) whether these fundamental ways of organizing information specifically relevant to motor vehicles are affected by beneficial social interactions.

Research Hypotheses

Beck et al. (1985) and Young (1994, 1999) have suggested that: (a) schemas form part of the normal cognitive process; (b) the use of specific schemas accelerates the appraisal of incoming environmental and situational cues; and (c) anxiety disorders arise whenever schemas become dysfunctional. Based on those models, the following hypotheses were formulated:

1. The schema relevant to road traffic situations was assumed to be highly specific in content and distinct from broader early schemas of personal and interpersonal vulnerability (i.e., not specific to road traffic situations). Therefore, relative to MVA survivors without PTSD, injured workers with post-injury sequelae, and members of the community, the schema content endorsed by MVA survivors with PTSD was expected to reflect more extreme and maladaptive vulnerability related specifically to driving situations. With respect to early mistrust and vulnerability schemas unrelated to road traffic situations, MVA survivors with PTSD were expected to differ significantly from others on the SQ prior to statistical adjustment for other influencing factors.
2. Cognitive processes may also be associated with the perception of pain, disability, and depression. MVA survivors with PTSD were expected to demonstrate maladaptive cognitive processing germane to post-MVA sequelae such as subjective pain, perceived disability, and depression severity by reporting higher levels of symptomatology than would others in the study.
3. It was expected that any group differences in maladaptive cognitions specific to the road traffic situations would be distinct from other variables such as early mistrust and vulnerability schemas (not specifically related to road traffic situations), subjective pain, perceived disability, and depression severity. Therefore, it was expected that, even after adjustment for any group differences on those variables, the MVRs of MVA survivors with PTSD, compared to others, would be more extreme and maladaptive.

Based on the study's literature review and conceptualization of social interactional influences, three additional hypotheses were formulated to test how social interactions might modify the experiences of those who had been involved in a traumatic MVA:

4. It was assumed that beneficial social interactions would be associated with lower levels of maladaptive distrust and vulnerability related specifically to motor vehicles and the operation thereof. Therefore, scores on the measure of beneficial social interactions were expected to be negatively correlated with those on the MVRs.
5. It was expected that, compared to MVA survivors without PTSD, MVA survivors with PTSD would report lower levels of perceived beneficial social interactions experienced within the previous 3 months.
6. It was expected that, after adjustment for any group differences on subjective pain, perceived disability, and depression severity, any group differences between the two MVA groups found for Hypothesis 5 on a measure of perceived beneficial social interactions experienced within the previous 3 months would be non-significant.

STUDY 1

The purpose of the Study 1 was to develop a tool to tap the content of a potential dysfunctional thought process germane to road traffic situations. In developing the MVRS questionnaire, the primary objective was to define a target construct and to develop an item pool that reflected that construct. The psychometric goal was to ensure internal consistency and, preliminary to the main investigation in Study 2, eliminate weak items from the measure.

Method

Scale Development

First, as recommended by Clark and Watson (1995, p. 310), the “target construct” was defined. The MVRS was described as a hypothetical construct or mental template for assessing personal and interpersonal vulnerability in situations involving motor vehicles and the operation thereof. The content of this schema was posited to be measurable on a continuum ranging from functional and adaptive to maladaptive and dysfunctional. At the dysfunctional or maladaptive end, content was expected to tap into vulnerability expressed as an exaggeration and overestimation of threat to the integrity and survival of self and significant others as well as an underestimation of the competence and concern of others specific to road traffic situations. The schema content at the high end of the scale was considered dysfunctional and maladaptive because it would probably heighten distress and promote avoidance of road traffic situations. The review of the literature revealed no previous attempt to develop a structured measure to tap the schema content specific to road traffic situations. However, Young (1990) had developed a questionnaire to measure fairly basic and broad maladaptive schemas relevant to personality disorders. The MVRS questionnaire was designed to be similar to Young’s measure in that it would tap into personal and interpersonal vulnerability, but distinct from the SQ questionnaire in that it would draw on content highly specific to road traffic situations.

Next, statements for the initial item pool were drafted based on extrapolation from the literature and consultation with clinicians who work with those who have been involved in MVAs. More specifically, item content was designed to: (a) parallel the type of cognitive processes hypothesized by Beck et al. (1985) to underlie anxiety; and (b) tap the content of a hypothetical maladaptive schema targeted by Blanchard and Hickling (1997) in their cognitive-behavioral

treatment protocol. Clinicians were queried regarding the types of comments MVA survivors might make when discussing an MVA or situations relevant to the operation of a motor vehicle subsequent to an MVA. The items were submitted to the clinicians for reviews and revisions. The pool of items was then reviewed by a selected group of individuals in the community. This provided an additional check for the readability, appropriateness, and relevance of items for individuals with various educational and life (including MVA) experiences. Items were checked for language biases and colloquialisms (APA, 1994b) and were submitted for final review by the clinicians.

The initial pool of items consisted of 34 statements such as “Most people know how to drive in bad weather” and “A lot of drivers take their anger out on the road” on a 6-point scale ranging from 1 (*totally disagree*) to 6 (*always agree*). For this pool, a total of 10 items were reverse-scored.

The response format chosen was a Likert-type rating scale with 6 options for consensus (*totally disagree* to *always agree*). Thus respondents had to choose between the lower and upper end of the scale. Further, it was expected that respondents would be able to make the differentiations required by this number of scale options. Finally, the format used was similar to the 6-point similarity items used to assess basic schemas on Young’s Schema Questionnaire (1990). The data collection on the initial pool items included no other questionnaires. Therefore, questions regarding age, sex, and experience of lifetime MVA were placed at the end of the initial pool of items.

The next step in scale development was the initial psychometric evaluation of the initial pool of items. The following sections describe the participants, procedures and results of that evaluation.

Participants and Procedure

During November 1997 and January 1998, participants for Study 1 were recruited from 2 third-year Industrial Psychology classes at the University of Ottawa, Ontario, Canada. The students formed a convenience sample upon which psychometric properties of the measure of the MVRS could be determined. The researcher read a recruitment script (Appendix A) to the students in each of the two classes. Students were advised that: (a) participation was voluntary

and withdrawal could be made at any time; (b) there was no reward for participation in the study and no cost or consequence for opting not to participate; and (c) that the professor would not be aware of participation status. In both cases, the professor left the classroom prior to the distribution of the questionnaire. The questionnaire was distributed to all students (Time 1). Those students who were reluctant to record their names or student numbers on the questionnaire were instructed to use a pseudonym if they wished to participate in the study. Completion of the questionnaire constituted consent. The students returned all copies of the questionnaire at the end of the allotted completion time. The researcher returned 3 weeks later (Time 2) and repeated the previously described procedure with both groups.

The final sample consisted of a total of 99 students who completed the questionnaire at Time 1. The student group tested in November 1997 (i.e., Class 1) consisted of 43 students; the student group tested in January 1998 (i.e., Class 2) consisted of 56 students. The majority of students in both classes were female (84% and 79%, respectively) and under the age of 24 (69.6%, $M = 23.52$, $SD = 5.42$ in Class 1; 81.5%, $M = 22.65$, $SD = 4.68$ in Class 2). Most students had experienced at least one lifetime MVA (71% in Class 1; 70% in Class 2). Of the students who participated at Time 1, 54 (54%) agreed to complete the questionnaire at Time 2. Students who did not participate at either Time 1 or Time 2 were not asked to provide demographic information, nor were they queried regarding the reason for non-participation.

Results

Preliminary Analyses

Data Screening

The SPSS package (SPSS Inc., 1995) was used to conduct all statistical analyses. Data were screened for accuracy of data entry, missing values, outliers, and univariate normality. Missing data points for demographic information were not recoded to the group mean because a substantial number of participants in Group 1 and Group 2 did not provide information regarding age ($n = 20$ and 2, respectively) and sex ($n = 11$ and 3, respectively). Participants missing data on demographics were excluded from analysis with those demographic variables. As recommended by Tabachnick and Fidell (1989, 1996), missing values for the initial pool of statements were recoded to the group item means. Of a total of 3,366 data points on the 34 initial pool items at

Time 1, a total of 13 missing items were recoded to the item means. This represented 0.39% of the total data for Time 1. For Time 2, one missing value was recoded to the item mean. This represented 0.05% of the total 1836 data points for Time 2. Eight (i.e., 0.15% of all data points) of these 14 missing values on the initial item pool were from Group 1 and six (i.e., 0.12% of all data points) missing values on the initial item pool were from Group 2. No univariate outliers were found ($p = .001$) for the initial item pool, nor were there any violations of univariate normality.

Demographic characteristics

Differences between the two classes with respect to demographic characteristics were explored using chi-square analyses with Bonferroni corrected alpha levels (i.e., $.05/3 = .016$). No significant differences were found for age, sex, or number of lifetime MVAs between the student samples. Therefore samples were combined for all analyses for the initial item pool.

Main Analyses

An item analysis (Spector, 1992) was conducted on the initial item pool. Although items may be deleted on the basis of score distributions, that elimination process is not recommended (and was therefore not done in this study) unless the scale has been tested with clinical and nonclinical samples (Clark & Watson, 1995). Therefore, internal consistency was examined. Cronbach's coefficient alpha for the initial item pool was .82 at Time 1 and .86 at Time 2. The corrected item-total correlations ranged from .01 to .62 at Time 1 and .07 to .56 at Time 2. The decision was made to delete items which failed to meet a cut-off criterion of .35 on the corrected item-total correlation at both Time 1 and Time 2, with the goal of excluding as many items as possible that were weak on both occasions (Spector, 1992). That allowed for the retention of a number of items that would have been deleted if low item-total correlation at either administration time had been the exclusion criterion. By adopting a broad exclusion criterion, it was hoped that the scale would be more representative of a coherent and meaningful schema content relevant to road traffic situations. A total of 11 items were deleted from the initial item pool. Cronbach's coefficient alpha did not change significantly when the 11 items were deleted from the initial item pool.

The 23 items that were retained formed the measure called the MVRS questionnaire. Items 4, 11, 21, and 22 on the MVRS questionnaire were reverse-scored. The internal consistency for the MVRS questionnaire was .82 at Time 1 and .87 at Time 2. The corrected item-total correlations for the MVRS questionnaire ranged from .19 to .64 at Time 1 and .26 to .60 at Time 2 (see Table 1). With one exception, all items met the cut-off criterion of .35 on the corrected item-total correlation at Time 1, Time 2, or both. The item-total correlation of item 3 for both test administrations (i.e., .31 and .33, respectively) was close to the cut-off criterion. Following a review of the statement for item 3 (i.e., “Others don’t care if they get into an accident.”) the researcher decided to retain all 23 items of the MVRS questionnaire, including item 3.

The range of possible scores on the MVRS questionnaire was 23 to 138. Participants’ scores in this study ranged from 42 to 110 at Time 1 ($n = 99$, $M = 77.95$, $SD = 13.40$) and from 39 to 110 at Time 2 ($n = 54$, $M = 75.28$, $SD = 14.08$). The MVRS questionnaire, found in Appendix B, demonstrated good stability over a period of 3 weeks. The Pearson product-moment test-retest correlation coefficients between scores on test and retest were .81, $p < .001$. Pearson correlations (for age and number of lifetime MVAs) and Spearman correlations (for sex) indicated that age, sex, and number of lifetime MVAs were not significantly correlated with the MVRS questionnaire at either Time 1 ($r = -.02$, $p = .89$, $r = .19$, $p = .08$, and $r = .01$, $p = .96$, respectively) or Time 2 ($r = .08$, $p = .58$, $r = -.25$, $p = .08$, and $r = .02$, $p = .87$, respectively). No significant differences were found between the scores of males and females on the MVRS questionnaire at either Time 1, $t(83) = 1.55$, $p = .125$, or Time 2, $t(49) = 1.43$, $p = .158$.

Discussion

In Study 1, the MVRS questionnaire demonstrated good face validity. This is important because the 23 statements were meant to reflect the content of a hypothetical maladaptive schema specific to road traffic situations. The items on the MVRS questionnaire were chosen specifically for their expected appeal to MVA survivors who develop PTSD. However, it was hoped that most people would be able to meaningfully rate the items on a continuum. Regardless of MVA history and PTSD status, not assessed in Study 1, participants in Study 1 appeared to do that. Based on the results of Study 1, the MVRS questionnaire demonstrated high internal consistency

Table 1

Corrected Item-Total Correlations for the Motor Vehicle-Related Schema Questionnaire (MVRS) for Study 1

Item	Time 1		Time 2	
	Item (<i>N</i> = 99) <i>M</i> (<i>SD</i>)	Corrected Item-Total Correlation	Item (<i>N</i> = 54) <i>M</i> (<i>SD</i>)	Corrected Item-Total Correlation
1	3.43 (1.09)	.50	3.46 (1.04)	.56
2	4.35 (1.33)	.45	4.26 (1.18)	.26
3	1.62 (.68)	.31	1.57 (.63)	.33
4	3.75 (1.43)	.32	3.18 (1.23)	.43
5	4.07 (1.14)	.36	4.15 (1.09)	.40
6	3.38 (1.63)	.27	3.61 (1.52)	.36
7	3.26 (1.22)	.40	2.94 (1.14)	.49
8	2.40 (1.07)	.25	2.31 (.93)	.51
9	4.75 (1.26)	.38	4.17 (1.31)	.49
10	3.09 (1.41)	.38	2.87 (1.17)	.41
11	4.43 (1.20)	.36	4.17 (1.09)	.33
12	4.06 (1.21)	.35	3.92 (1.18)	.49
13	2.35 (1.35)	.40	2.26 (1.10)	.38
14	2.09 (1.27)	.39	2.06 (1.29)	.50
15	3.52 (1.36)	.19	3.04 (1.13)	.49
16	4.29 (1.36)	.53	4.42 (1.14)	.43
17	2.76 (1.30)	.64	2.89 (1.22)	.60
18	3.66 (1.32)	.39	3.59 (1.32)	.55
19	2.95 (1.40)	.44	3.13 (1.24)	.34
20	3.17 (1.37)	.35	3.17 (1.46)	.41
21	3.61 (1.39)	.38	3.56 (1.51)	.56
22	3.81 (1.11)	.24	3.33 (1.06)	.48
23	3.14 (1.30)	.38	3.20 (1.40)	.40

Note. Cronbach's coefficient alpha is .82 at Time 1 and .87 at Time 2.

and appeared to measure a fairly narrow construct. However, the number of participants in Study 1 was not large enough to allow for factor analysis to determine unidimensionality of the scale. This could be established in future research. Nevertheless, this study was an important first step in the development of a measure to test the content of a schema relevant to road traffic situations.

STUDY 2

Study 2 first attempted to determine if those individuals who manifest PTSD post-MVA have a fundamentally different view of their vulnerability and their ability to trust others in road traffic situations. Study 2 next sought to learn if these fundamental ways of organizing information specifically relevant to motor vehicles are affected by beneficial social interactions.

Method

Participants

It was hypothesized that MVA survivors with PTSD would differ from those without PTSD in their evaluation of vulnerability relevant to the operation of a motor vehicle (e.g., other drivers, laws, road conditions). To test this hypothesis, a group of MVA survivors with PTSD were compared to a group of MVA survivors without PTSD. However, both significant and non-significant findings would be difficult to interpret if only the two MVA groups were compared. Therefore, two control groups were used to address the question of specificity of maladaptive MVRS in those who develop PTSD subsequent to traumatic MVA. It was expected that the group of MVA survivors with PTSD would also be distinct from those with non-MVA injury and those who have no recent injury experience. Given the similarities (e.g., pain, disability, PTSD) between those injured at work and those injured in MVAs (Asmundson et al., 1998), a group of workers injured while performing their jobs (i.e., excluding MVAs) formed a clinical control group. A final control group of individuals who shared few similarities (i.e., no history of or treatment for either a work or MVA-related injury within the past 10 years) with either the MVA survivors or the injured workers was drawn from a general sample.

All participants in Study 2 had to meet the following basic age and language skill requirements: (a) be 18 years of age or older; and (b) understand written and spoken English sufficient to complete the questionnaire test battery. A total of 115 potential participants for Study 2 were drawn from a broad area of Eastern Ontario, Canada. Potential participants were recruited for one of the four groups in this study in the manner described within the section on recruitment.

Recruitment and Initial Group Assignment

MVA Survivors. The sample of MVA survivors was recruited through circulation of the Motor Vehicle Accident Research Project Description (Appendix C) to a number of health care facilities (i.e., physiotherapy clinics and psychologists' offices) and through a presentation made to a community-based support group for people with chronic pain disorders. Targeted individuals who had experienced an MVA and were interested in participating either: (a) provided their name and phone number to the health care provider; or (b) contacted the researcher directly through a phone number provided on the information sheet. Almost all MVA survivors contacted the researcher themselves. Potential participants had to have been directly involved (i.e., actually in a motor vehicle or struck by a motor vehicle) in an MVA a minimum of 3 months prior to participation in the study, and had to have been self or clinically referred to a health care provider for treatment of physical or psychological problems related to the MVA. At the time of the first contact, the researcher provided additional information by reading the Motor Vehicle Accident Research Information (Appendix D) and scheduled an interview for potential participants who expressed ongoing interest. Although none of the 61 MVA survivors who contacted the researcher refused to participate in the study, for health reasons, 4 female potential participants were subsequently unable to do so. Difficulties in contacting potential participants or with scheduling interviews eliminated another 4 female potential MVA participants.

Injured Workers. The control group of injured workers (IW) was drawn from the same health care facilities and support group as the MVA survivors. In addition, participants for the IW group were recruited through presentations to IW support groups. The IW group shared some of the same characteristics and problems (e.g., pain, disability, compensation) with the MVA survivor groups but differed in not having an MVA injury history. IW participants had to have been injured while on the job a minimum of 3 months prior to participation in the study, and had to have been referred (i.e., self or clinically) to a health care provider for treatment of problems (i.e., physical or psychological) related to the work injury. In addition, IW participants must not have experienced an MVA within the past 5 years. It was expected that some of the IW participants might meet criteria for PTSS or PTSD arising from work accidents but not from MVAs. A study by Asmundson, Norton, Allardings, Norton, and Larsen (1998) found rates of

18.2% and 34.7%, respectively, for PTSS and PTSD in a sample of injured workers. The IW participants followed the recruiting process outlined above. All but 1 (female) of the 30 potential IW participants indicated ongoing interest. However, difficulties in scheduling interviews eliminated 3 male potential participants. At the time of the scheduled interview, with the exception of 1 potential IW participant (male) who was significantly emotionally distressed precluding participation at the time, all potential participants for the IW group agreed to participate in the study.

Community Sample. Another control group comprised a community sample (CS) which was recruited from a number of office settings and work sites. This group differed from the other groups in that it was a non-clinical sample; that is, participants in this group were not currently in treatment for work-related or MVA-related physical or psychological injury. Further, the participants in this group had no positive history for significant work injury or motor vehicle accident within the past 10 years. Based on PTSD rates found in community samples (Breslau et al., 1991), it was expected that some CS participants might meet criteria for PTSS or PTSD (APA, 1994a). Two of the 24 potential CS participants (1 male, 1 female), refused participation. Reasons given for refusal were time and spousal objection. In addition, 1 female potential CS participant moved and left no contact number or address. All potential CS participants who met with the researcher for the interview agreed to participate in the study.

Final Group Determination

Participants were grouped according to the initial group selection process. The MVA group was then further classified according to PTSD status. PTSD status was determined by the CAPS. Of the 99 participants who initially participated in the study, 92 participants provided usable data. Incomplete or unusable data were provided by 3 female MVA participants, 2 male and 1 female IW participants, and 1 male CS participant. Of the remaining 92 participants, 7 female MVA survivors were found to have PTSS (*n* insufficient for data analysis). Another 5 participants did not clearly fit into either the MVA or the IW groups because of the presence of positive history of both MVA and work-related trauma. Consequently, all of the aforementioned participants were eliminated from the study, leaving a total of 80 participants (i.e., 20 per group) in the study.

Procedure

Potential participants who declined or were unable to participate, either at the time of the first contact or at the time of the scheduled interview, were thanked for their time. At the time of the interview, potential participants were asked to read the Motor Vehicle Accident Research Information and to discuss any concerns (i.e., regarding their participation in the study). The 99 individuals who opted to participate in the study signed two copies of the Motor Vehicle Accident Research Project Consent Form (Appendix E). Each participant was provided with one copy of the signed consent form, the information sheet, and a list of resources (Appendix F). Those who agreed to participate were interviewed by the researcher. The semi-structured interviews were conducted in office settings or in participants' residences as required. Following a brief explanation of the questionnaire package, participants were given the choice of completing the questionnaire package with the researcher or on their own.

Measures

Given the issues raised by a number of researchers in the assessment of PTSD (Blanchard, Hickling, Vollmer, et al., 1995; Honig et al., 1999), as well as Meichenbaum's (1994) recommendation for the assessment of PTSD through the use of a number of different assessment tools, multiple measures were used for the assessment of PTSD in Study 2.

In addition, a number of factors that might influence thought processes were examined. Hence, participants rated comorbid perceived pain and disability as well as self-reported depression. The measures chosen to assess those factors were widely used instruments with well-established psychometric properties. Basic vulnerability schemas and perceived beneficial interactions were also assessed. The choice of instruments used to evaluate those factors was based on the availability of established measures for the assessment of those concepts.

Demographics

The Motor Vehicle Accident Questionnaire (MVAQ), found in Appendix G, was designed for this study. Participants were asked to reply to questions concerning: (a) general demographics- age, sex, place of birth, education, spoken languages, marital status, number of children; (b) family history rating scale (i.e., the sum of positive responses to 6 statements concerning family history of physical disabilities and psychiatric disorders such as depression,

anxiety, and substance abuse); (c) personal history rating scale (i.e., the sum of positive responses to 10 statements concerning participants' experiences of significant loss such as separation, death, serious illness, disability); (d) MVA history: number of lifetime MVAs, number of months since last MVA, number of vehicles involved in the accident, number of occupants in the MVA survivor's vehicle at the time of the MVA, self-reported injury severity (mild, severe), chronic pain arising from MVA injuries, responsibility for the MVA, fatalities resulting from the MVA; (e) employment: pre-accident employment status, current employment status.

The MVAQ addressed demographics (e.g., age, sex, education) commonly reported in other research papers. In addition, respondents reported on a number of items (family history, personal history, number of lifetime MVAs) that are less generally reported but of specific interest in the PTSD literature reviewed in the introduction. For example, Breslau et al. (1991) and Blanchard and Hickling (1997) have addressed these demographics. Finally, some items, such as employment status, and number of children (implicated in caretakers' burdens) are rarely reported in the literature.

Semi-Structured Interview for PTSD

The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1998) is a structured clinical interview designed to assess PTSD in adults. The first section of the CAPS consists of an exploration and an assessment of self-reported exposure to events that could potentially meet Criterion A. The next section of the CAPS, allows for the evaluation of "symptom status" during the week preceding the interview as well as "current" PTSD during the month preceding the interview (Blake et al., 1990b, p. 2). Respondents rate the frequency and intensity of each the 17 symptoms of PTSD described in DSM-IV (APA, 1994a) on a 5-point scale where 0 is the lowest and 4 is the highest. The sum of intensity and severity scores constitute the global rating scale which can range from 0 to 136. To meet diagnostic criteria on any symptom during the specified time frame, the frequency rating must be at least 1, and the intensity rating must be at least 2 (Blake et al., 1990b). The ratings of frequency and intensity on this measure provide an advantage over other scales which traditionally only provide severity ratings (Blake, 1994). The CAPS is a revision of the CAPS-1 (Blake et al., 1990a), a measure designed to assess PTSD in accordance

with the criteria listed in DSM-III-R (APA, 1987). Characteristics of the CAPS should be similar those reported for the CAPS-1.

The CAPS-1 has good interrater reliability for agreement on diagnostic classification (100%) and interrater reliability (0.92 to 0.99) for frequency and intensity scores for symptom clusters from (Blake et al., 1990a). Internal consistency ranges from 0.73 to 0.85 for symptom clusters (Blake et al., 1990a). Further, the CAPS-1 correlates strongly with various self-report measures of PTSD symptomatology (Blake et al., 1990a; Weathers & Litz, 1994). Neal et al. (1994) found correlations with the Impact of Event (IES; Horowitz et al., 1979; Zilberg et al., 1982) total scale, IES intrusion, and IES avoidance of .81, .75, and .79 respectively. Test-retest reliability coefficients for the CAPS-1 range from 0.77 to 0.96 for the 3 symptom clusters and 0.90 to 0.98 for the total severity score. Internal consistency ranges from 0.73 to 0.87 for the 3 symptom clusters (Blake et al., 1990a; Weathers & Litz, 1994).

The CAPS-1 (Blake et al., 1990a) has been used with survivors of motor vehicle accidents (Blanchard, Hickling, Vollmer et al., 1995) and has been shown to be sensitive to changes in symptomatology over time. In a study of recent MVA survivors, Blanchard, Hickling, Taylor, and Loos (1995) assessed participants according to DSM-III-R (APA, 1987) and DSM-IV (APA, 1994a) criteria for PTSD using the CAPS-1 and a modified (for DSM-IV criteria) version of the CAPS-1. Differences in PTSD classification (i.e., PTSD, PTSS, non-PTSD) were found. However, such differences should be expected because diagnostic criteria differed.

Study 2 used the CAPS (Blake et al., 1998) because it was designed for use with DSM-IV (APA, 1994a) which is now the accepted criterion standard for diagnosis. Participants were assessed for current PTSD status. The most conservative measure (i.e., rule of 3), the standard for this version of the CAPS, determined PTSD status. In Study 2, internal consistency of the CAPS was .95. Interrater reliability was not established as part of this study. However, group classifications for participants in this study, established on the basis on the CAPS, were corroborated by the Impact of Event Scale (IES; Horowitz et al., 1979; Zilberg et al., 1982) and the Accident Fear Questionnaire (AFQ; Kuch et al., 1995). A sample CAPS question can be found in Appendix G.

Current Distress

The Impact of Event Scale (IES; Horowitz et al., 1979; Zilberg et al., 1982), found in Appendix G, is a 15-item self-report measure of current (i.e., during the past week) symptomatology designed specifically for use with those exposed to traumatic events (Horowitz et al., 1979). The IES is one of the most frequently used self-report measures in research on responses to traumatic events (B. L. Green, 1991). Respondents in the present study reported subjective distress during the past week by rating the frequency of each of the 15 items on a 4-point scale where 0 = *not at all*, 1 = *rarely*, 3 = *sometimes*, and 5 = *often* (Zilberg et al., 1982, p. 408).

Specific responses to the traumatic event are tapped by the intrusion (i.e., items 1, 4, 5, 6, 10, 11, and 14) and avoidance (i.e., items 2, 3, 7, 8, 9, 12, 13, and 15) subscales. Factor analysis supports the use of those subscales (Horowitz et al., 1979; Schwarzwald, Z. Solomon, Weisenberg, & Mikulincer, 1987; Zilberg et al., 1982). It has been observed that, over time, intrusion and avoidance may merge into one general factor of distress (Hendrix, Jurich, & Schumm, 1994).

The IES has demonstrated good split half reliability ($r = .86$), good test-retest reliability ($r = .87$ to $.93$ total scale, $.89$ intrusion, and $.79$ avoidance), and good internal consistency (Cronbach's coefficient alpha = $.78$) in samples who have experienced events such as bereavement, accidental injury, illness, violence, or surgery (Hendrix et al., 1994; Horowitz et al., 1979). The IES discriminates between those who have experienced exposure to traumatic events of different intensities (Horowitz et al., 1979) and between genuine and factitious cases (Perkins & Tebes, 1984). In addition, the IES is sensitive to change across time (Horowitz et al., 1979; Horowitz et al., 1984; Zilberg et al., 1982). Score changes are related to self-blame and life stress (Horowitz et al., 1984). This measure has been used in the study of PTSD in motor vehicle accident survivors (Blanchard, Hickling, Vollmer, et al., 1995; Bryant & Harvey, 1995; Feinstein & Dolan, 1991). In a study by Kuch et al. (1995), MVA survivors with PTSD reported mean total IES scores of 44.80 ($n = 12$, $SD = 8.42$) whereas MVA survivors without PTSD reported mean total IES scores of 25.75 ($n = 27$, $SD = 12.71$). Reported mean avoidance levels were 22.07 ($n = 12$, $SD = 5.20$) and 13.08 ($n = 27$, $SD = 6.47$) respectively for MVA survivors with PTSD and

MVA survivors without PTSD (Kuch et al., 1995). Reported mean intrusion levels were 22.68 ($n = 12$, $SD = 4.39$) and 12.69 ($n = 27$, $SD = 6.60$) respectively for MVA survivors with PTSD and MVA survivors without PTSD (Kuch et al., 1995).

A number of researchers, including B. L. Green (1991) and Meichenbaum (1994), recommend the use of the IES in the assessment of PTSD. A cut-off score of ≥ 30 has recently been used to indicate significant levels of PTSD found in a group of participants who had survived motor vehicle accidents (Bryant & Harvey, 1995). In a study conducted by Blanchard and Hickling (1997), of those recent (i.e., 1-4 months post-MVA) MVA survivors who met classification for PTSD on the CAPS-1, only 58% met the cut-off score on the IES, 18% scored 21-30, and 23% scored 20 or lower. Further, 10% of the MVA survivors who did not meet PTSD classification on the CAPS-1 met the cut-off score for PTSD on the IES. Reported mean scores on the IES were 35.4 ($n = 61$, $SD = 17.7$) for the MVA PTSD group and 8.2 ($n = 50$, $SD = 11.4$)

In Study 2, internal consistency was high for the IES total score as well as for the intrusion and avoidance subscales ($r = .93$, $.91$, and $.85$, respectively). Participants in Study 2 completed the IES at one time only, that is, at the time of their participation in the study. A comparison of CAPS diagnoses and IES scores is provided in the results section (i.e., group classification).

Accident Fear and Avoidance

The Accident Fear Questionnaire (AFQ; Kuch et al., 1995), found in Appendix G, is a 20-item self-report measure intended as a screening measure for PTSD and "accident phobia" (defined in this study as "subsyndromal PTSD") subsequent to motor vehicle accident. Respondents in Study 2 rated how they felt during the MVA and nervousness following the MVA (forced "yes" or "no" response) on the first 10 "supplemental items" (Kuch et al., 1995, p.506). Responders also rated "phobic avoidance" (Kuch et al., 1995, p.506) on items 11- 20 on a 9-point scale where 0 = "*would not avoid it*" and 8 = "*always avoid it*" (p. 513) for a maximum score of 80. The AFQ is one of the few measures developed specifically for use with survivors of motor vehicle accidents.

Kuch et al. (1995) have demonstrated that the AFQ has good internal consistency (Cronbach's coefficient alpha = .89) and the ability to differentiate among groups diagnosed with PTSD ($M = 54.44$, $SD = 11.36$), phobia ($M = 34.00$, $SD = 14.77$), and non-PTSD ($M = 14.66$,

$SD = 12.46$). In comparing results obtained in Study 2 to those reported in the Kuch et al. (1995) study, the reader should be aware that the PTSD status for participants in the Kuch et al. (1995) study was determined using a structured interview other than the CAPS. Determination of PTSD status depends, to some extent, on the type of interview used for classification (Honig et al., 1999). In Study 2, the AFQ (avoidance) demonstrated good internal consistency (Cronbach's coefficient alpha = .89). The AFQ *nervousness* subscale referred to in this study refers to the number of positive responses on the supplemental items. Kuch et al. (1995) did report group differences on the nervousness subscale. In this study, reliability for the items on the AFQ nervousness subscale was barely acceptable (Cronbach's coefficient alpha = .64).

Subjective Pain

Pain severity was measured using the short form of the McGill Pain Questionnaire (SF-MPQ; Melzack, 1987) found in Appendix G. The SF-MPQ is a self-report measure which consists of 15 representative words selected from the sensory (11 items) and affective (4 items) categories of the standard MPQ (LF-MPQ; Melzack, 1975). Respondents rated each word descriptor (e.g., sharp, heavy, fearful) on a 4-point severity scale (0 = *none*, 3 = *severe*). The sum of the intensity values for each of the 15 descriptors provided a Pain Rating Score (PRS).

The SF-MPQ was developed specifically for use in research when administration time is limited and the information required is less than that provided on the LF-MPQ (Melzack, 1987). Studies by Melzack (1987) have shown that pre- and post-treatment total scores on the SF-MPQ and LF-MPQ are significantly correlated for a wide group of patients experiencing post-operative, obstetrical, and musculoskeletal pain ($r = .77, .81$, and $.93$, respectively). Melzack (1987) reported mean subjective pain severity of 11.1 ($SD = 8.7$) to 13.4 ($SD = 7.8$) for those with musculoskeletal pain, postsurgical pain, and labor pain. Similarly, Dudgeon, Raubertas, and Rosenthal (1993) found that, on three separate administrations, all domains of the SF-MPQ correlated highly with the LF-MPQ ($r = .88, .87, .77$) in a sample of patients with chronic cancer pain. Pre-medication mean subjective pain severity reported by Dudgeon et al. (1993) for those with chronic cancer pain ranged from 8.58 ($SD = 7.44$) to 9.58 ($SD = 9.30$). Further, the SF-MPQ scores have been shown to be sensitive to treatment effects for women in labor (Melzack, 1987), patients with musculoskeletal pain (Melzack, 1987), herpes zoster, and postherpetic neuralgia

(King, 1993). The SF-MPQ has not only differentiated between mild and severe pain (King, 1993), but has also differentiated groups on the basis of a variety of treatment modalities in a study of patients with chronic cancer pain (Guieu, Tardy-Gervet, & Roll, 1991). Finally, a study by Grönblad, Lukinmaa, and Kontinen (1990) demonstrated that, compared to other pain measures such as visual analogue scales, numerical rating scales, and pain drawings, the SF-MPQ had superior test-retest stability over a period of 4 to 5 weeks. In Study 2, the SF-MPQ demonstrated a high internal consistency (Cronbach's coefficient alpha = .94).

Perceived Disability

Pain disability, as defined by Pollard (1984), refers to "the extent to which chronic pain interferes with a person's ability to engage in various life activities" (p. 975). The Pain Disability Index (PDI; Pollard, 1984), found in Appendix G, is a 7-item self-report measure which assesses perceived disability related to chronic pain. Responders rated levels of disability in seven broad areas of activity including "family and home responsibilities, recreation, social activity, occupation, sexual behavior, self-care, and life support activity" on an 11-point scale ranging from 0 = *no disability* to 10 = *total disability* (Pollard, 1984, p. 974).

Based on the median split, the PDI has been shown to discriminate between "high" and "low" ($M = 34.5$, $S.D. = 9.32$) disability in post-surgical patients (high: $M = 48.89$, $SD = 14.1$; low: $M = 16.78$, $SD = 10.29$) in a study by Pollard (1984, p. 974) and those with chronic pain (high: $M = 55.9$, $S.D. = 5.78$; low: $M = 34.5$, $SD = 9.32$) in a study by Tait, Chibnall, and Krause (1990). Studies by Grönblad et al. (1990), Tait et al. (1990), and Tait, Pollard, Margolis, Duckro, and Krause (1987) have shown that the PDI has high internal consistency ($r = .89$, $.87$ and $.86$, respectively). Factor analyses have produced 1- (Tait et al., 1990) and 2-factor (Tait et al., 1990; Tait et al., 1987) solutions. The 2-factor solution incorporated voluntary (Factor 1) and obligatory (Factor 2) activities. Reliabilities for Factor 1 and Factor 2 were $.85$ and $.70$, respectively. Test-retest reliability is uncertain (Tait et al., 1990). However, findings in a recent study (Grönblad et al., 1990) of a small sample of patients with chronic pain demonstrated stability ($r = .89$) which was superior to that of other pain measures. In Study 2, the PDI demonstrated a high internal consistency (Cronbach's coefficient alpha = .94).

Self-Reported Depression

The Beck Depression Inventory-Second Edition (BDI-II: Beck, Steer, & G. K. Brown, 1996), a measure designed to assess self-reported depression, is a major revision of the BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI (Beck et al., 1961), introduced in 1961 and revised in 1979 (Beck et al.), was one of the most widely used instruments for assessing depression in those with psychiatric, nonpsychiatric, and chronic pain conditions (A. C. Williams & Richardson, 1993).

The BDI-II (Beck et al., 1996) is a 21-item self-report measure of cognitive and affective symptoms based on the diagnostic criteria for depressive disorders listed in the DSM-IV (APA, 1994a). Each item contains a set of 4 statements rated on a 4-point scale ranging from 0 to 3 (Beck, Steer, Ball, Ranieri, & Beck, 1996). Respondents in this study rated each item for depression severity during the two weeks prior to completion of the questionnaire.

Studies of participants diagnosed with mood disorders (Beck, Steer, Ball, et al., 1996; Steer et al., 1999) and student samples (Dozois, Dobson, & Ahnberg, 1998; Osman et al., 1997) have found the BDI-II to have high internal consistency (Cronbach's coefficient alpha ranged from .90 to .91). The BDI-II has demonstrated good construct validity (i.e., correlation with the BDI = .94 and .93, respectively) in different samples of outpatients investigated by Beck, Steer, Ball, et al. (1996) and Dozois et al. (1998). Those studies that compared the BDI and the BDI-II also found that mean ratings on the BDI-II were 1.54 (Dozois et al., 1998) to 2.01 higher (Beck, Steer, Ball, et al., 1996) than the mean BDI scores for the same participants. The mean scores for the BDI-II reported in the literature are as follows: (a) 22.36 ($SD = 11.92$) for a group of outpatients diagnosed with various mood disorders including anxiety, major depression, and bipolar depression (Beck, Steer, Ball, et al., 1996); (b) 28.64 ($SD = 11.75$) for a group of outpatients diagnosed with clinical depression (Steer et al., 1999); (c) 9.41 ($SD = 9.41$) and 9.11 ($SD = 7.57$) respectively, in samples of students (Osman et al., 1997; Dozois et al., 1998). Although one study found sex to be related to scores on the BDI-II (Steer et al., 1999), others did not (Beck, Steer, Ball, et al., 1996; Dozois et al., 1998; Osman et al., 1997). In a study conducted by Osman et al. (1997), the BDI-II demonstrated discriminant and convergent validity. The findings of Osman et al. (1997) study further suggest that anxiety and depression are related but distinct constructs.

Whereas Osman et al. (1997) found a 3-factor structure for the BDI-II, Steer et al. (1999) and Dozois et al. (1998) found somewhat different 2-factor solutions.

In their investigation, Steer et al. (1999) constructed a "Cognitive" (C) subscale ($M = 9.82$, $SD = 4.95$) and a "Noncognitive" or "Somatic-Affective" (SA) subscale ($M = 18.82$, $SD = 8.00$). The Cognitive subscale comprised eight items including items 2 and 3, items 5 to 9, and item 14. The remaining 13 items formed the SA subscale. Both the C and the SA subscales demonstrated good internal consistencies (Cronbach's coefficient alpha = .81 and .87, respectively). The SA subscale was correlated with being female. Steer et al. (1999) have recommended the use of these two subscales "in populations in which somatic symptom complaints are known or suspected to be attributable to medical or other conditions rather than depression per se" (p. 126). This is consistent with previous concerns regarding the use of the BDI with patients who have chronic pain (Novy, Nelson, Berry, & Averil, 1995; Williams & Richardson, 1993) and recommendations for the use of separate subscale scores in that population (Novy et al., 1995; Williams & Richardson, 1993).

Based on the Steer et al. (1999) identified subscales, the BDI-II-C and BDI-II-SA scores, as well as the BDI-II total score, were determined for Study 2. The BDI-II demonstrated a good internal consistency on the BDI-II-C and high internal consistencies on the BDI-II-SA and BDI-II total score (Cronbach's coefficient alpha = .84, .94, and .95 respectively). In accordance with copyright restrictions, the BDI-II has not been reproduced in the Appendices of this study.

Early Schemas

The Schema Questionnaire (SQ; Young & Brown, as reproduced in Young, 1994) is a 205 item questionnaire designed to tap into the 16 distinct "early maladaptive schemas" (Schmidt et al., p. 300) that form "four broad categories" of schemas (Young, 1994, p. 12). Young (1994) and Schmidt et al. (1995) have linked various subscales to specific psychiatric disorders. However, no schema has specifically been linked to PTSD.

The 17 items of the "mistrust/abuse" subscale and the 14 items of the "vulnerability to harm or illness" subscale appeared to be most relevant to PTSD in MVA survivors. Those two subscales represent two categories of early schemas identified by Young (1994, 1999). The first reflects fear and anxiety germane to threats to physical or emotional well-being and survival. The

latter incorporates fear and anxiety apropos intentional harm and disconnection. Research by Schmidt et al. (1995) suggests that those who score high on the mistrust subscale may be at risk for experiencing depression, whereas those who score high on the vulnerability subscale may be at risk for experiencing anxiety, both of which are highly relevant for those with PTSD. Further, a recent study by Welburn, Dagg, Coristine, and Pontrefact (1999) demonstrated that ratings on the maladaptive vulnerability schema (measured on a short form of the SQ) decrease in response to an increased feeling of safety. These two subscales were the only ones used in this study because they were most reflective of the core vulnerability elaborated by Beck et al. (1985).

The diagnosis of PTSD subsumes vulnerability and disconnection. For a sample of patients with PTSD, intrusive recollections have been associated with illness, injury and harm inflicted by others (Reynolds & Brewin, 1999). Research conducted by Warda and Bryant (1998a) has demonstrated inflated probability ratings by MVA survivors with ASD for future events and the negative consequences of such events. Those who have experienced prolonged trauma report “feeling as if no one understands, feeling unable to trust” (Newman, Orsillo, Herman, Niles, & Litz, 1995). This implies a sense of disconnection, a loss of one’s social network or some important aspect of the social network, an interpersonal vulnerability. Therapeutic work (Blanchard & Hickling, 1997) implies that personal and interpersonal vulnerability are important aspects of PTSD in MVA survivors. The examples of cognitions reflect personal and interpersonal vulnerability. The integration of significant others in the treatment protocol, particularly the emphasis on sharing enjoyable activities and changing interactional styles, promotes interpersonal connection.

Respondents in Study 2 rated mistrust (and abuse) and vulnerability (to harm and illness) on a 6-point scale ranging from 1 (*completely untrue of me*) to 6 (*describes me perfectly*). In a study conducted by Schmidt et al. (1995), the mistrust subscale (items 28-44) and the vulnerability subscale (items 103 to 116), found in Appendix G, demonstrated high internal consistency (Cronbach’s coefficient alpha = .93 and .88, respectively) and adequate test-retest reliability over a 3-week period ($r = .78$ and $.57$, respectively) in a sample of undergraduate students. In Study 2, the mistrust and vulnerability subscales demonstrated high internal consistency (Cronbach’s coefficient alpha = .89 and .90, respectively).

In Study 2, scores on the two subscales were combined to form the SQ score. There were two reasons for this: (a) the subscales are part of a larger scale; and (b) the subscales were highly correlated ($r = .69$) in Study 2. In the case of highly correlated dependent variables (DV's), Tabachnick and Fidell (1996) recommend eliminating a DV or merging the two DV's if they are to be used in multivariate statistics. For the combined mistrust and vulnerability subscales referred to as the SQ in this study, internal consistency was .80.

Motor Vehicle-Related Schemas

The 23-item Motor Vehicle-Related Schema (MVRS) questionnaire (Appendix B), designed specifically for this investigation, was described in Study 1. In Study 1, the MVRS demonstrated high internal consistency at both Time 1 and Time 2 (Cronbach's coefficient alpha = .82 and .87, respectively), as well as high test-retest reliability ($r = .81$). In Study 2, the internal consistency of the MVRS questionnaire was .89.

Subjective Experience of Social Interactional Influences

The Crisis Support Questionnaire (CSQ; Joseph et al., 1992), found in Appendix G, is a self-report questionnaire which taps subjective experience of emotional and practical social interactions. Whereas respondents described in previous research had experienced a common event (Joseph et al., 1992; Joseph, Yule, R. Williams, & Hodgkinson, 1994), respondents in this study experienced a number of separate accidents which differed from one another in type, severity, and date of occurrence. Therefore, respondents in Study 2 rated social interactions during the 3-month period preceding participation in the study (i.e., items 2, 4, 6, 8, 10, 12, 14) but did not rate social interactions during the 3-month period immediately following the accident as was the case in other studies (Joseph et al., 1992; Joseph et al., 1994). Responders rated the 7 items on a 7-point scale where 1 = *never* and 7 = *always* (Joseph et al., 1992, p. 65). Higher scores indicated higher levels of support. Item 6 was reverse-scored. In this study, the original wording of the CSQ was changed so that it would more readily reflect the experiences of the participants. Thus the word "disaster" was replaced by the word "accident".

Internal consistency for the CSQ has ranged from $r = .69$ to .80 in studies of different samples of survivors of cruise ship disasters (Joseph et al., 1992; Joseph, Yule, Williams, & Andrews, 1993). Scores on the CSQ completed 3 months following the traumatic event

negatively correlated ($r = -.64$) with the IES avoidance subscale measured 18 months post-event (Joseph et al., 1993) and satisfaction with social interactions (i.e., CSQ item 7) was negatively correlated ($r = -.55$) with symptomatology (Joseph et al., 1994). In Study 2, the CSQ demonstrated a good internal consistency (Cronbach's coefficient alpha = .78).

Data Analysis

Sample Size

Sample size estimates for this study were based on an alpha set at .05, power of 0.80, and an expected effect size of .20. A medium effect size was chosen to maximize the possibility of finding both clinical significance as well as statistical differences. In this study, MVA survivors with PTSD were compared with MVA survivors without PTSD, injured workers, and a community sample. To provide for an equal number of participants per group, the N for this study was 80 (i.e., n for each group = 20).

As stated, alpha level was set at .05 for this study even though Stevens (1986) has indicated that the use of a less stringent alpha of .10 or .15 is acceptable when group sizes are small (i.e., $n = \leq 20$) because power and type II error are dependent on sample size. Although the more liberal alpha levels may have yielded a greater number of significant results than reported in this study, it was hoped that the choice of a more stringent alpha level would yield results with practical significance as well as statistical significance. Compared to an alpha level of .10, alpha levels of .05 and .01 are commonly used and more readily compared with previous findings. In this study, exact probability values (i.e., probability of obtaining the particular value of the computed statistic given a true null hypothesis) are provided so that the reader can determine which analyses would have been significant at the more liberal .10 alpha level.

Exclusion from Analyses

Exclusion on Group Comparisons

All participants were asked to complete all of the measures during the data collection phase of the study. The relevance of each of the measures (e.g., were the measures designed for administration to individuals who have not had particular experiences) for each of the participant groups was assessed. The decision for including or excluding any group on a particular measure was made on the basis of: (a) sample characteristics in previous reported administrations of the

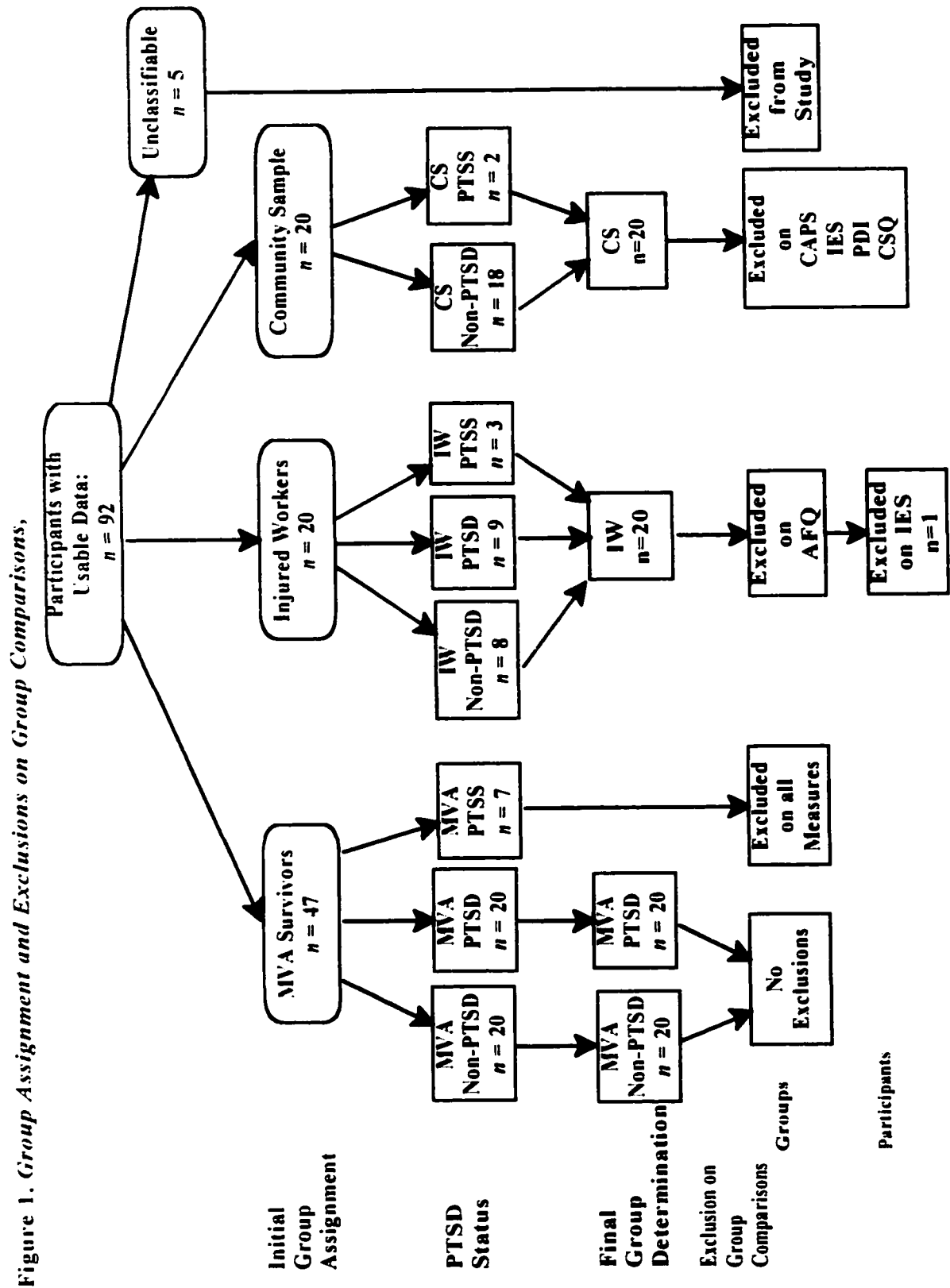
measure; (b) participants' reported lifetime experiences; (c) exclusion of 25% or more of the group's participants on any particular measure.

All of the measures appeared relevant for all participants in both of the MVA groups. As reported in the method section, a number of the measures had been used in previous research of survivors of MVAs or other traumatic experiences. Similarly, the IW group was included in group analyses of most of the measures. The IW group was excluded on the AFQ because 6 (30%) of the group's participants had never experienced an MVA. Typically, the AFQ has been administered only to MVA survivors (Kuch et al., 1995). Finally, the relevance of a number of measures completed by the CS group was assessed. The CS group was excluded from all group analyses on the PDI because that measure has only been administered to patient groups in which varying degrees of perceived physical disability were expected (GrÖnblad et al., 1990; Pollard, 1984; Tait et al., 1990). Such was not the case for the CS group in this study. Similarly, the CSQ has been administered exclusively to individuals who have experienced a traumatic event (Joseph et al., 1992, 1993, 1994). Such is the case for previous administrations of the CAPS-1 (Blanchard et al., 1994, 1996, 1997) as well as the IES (Horowitz et al., 1979; Neal et al., 1994; Schwarzwald et al., 1987). Twelve (60%) participants in the CS group reported no past experience of a *perceived* significant life event. Eight (40%) of those had no previous involvement in an MVA. Consequently, the CS group was excluded from group analyses on the following measures: (a) PDI, (b) CSQ, (c) CAPS, (d) IES, and (e) AFQ (see Figure 1).

Exclusion of Participants

As found in Figure 1, 7 MVA survivors with PTSS were eliminated from the study. A classification of PTSS is equivalent to neither PTSD nor non-PTSD, therefore MVA survivors with PTSS were excluded from participation in any group other than a PTSS group. The number of MVA survivors with PTSS was deemed insufficient for group comparisons. Consequently, all MVA survivors with PTSS were eliminated from data analyses.

Based on the study conducted by Asmundson et al. (1998) it was expected that a number of participants in the IW group would meet the criteria for PTSD and PTSS. Nine (45%) of the 20 IW participants met the criteria for PTSD. Another 3 (15%) IW participants met the criteria for PTSS. Regardless of PTSD status, IW participants were included in this study because the IW



group was an injury control group, that is, a comparison group of individuals who shared injury experiences but whose injuries were not due to MVAs. A control group used by Blanchard and Hickling (1997) included participants who had not been involved in an MVA within the past year but who had reported: (a) prior trauma (35%), (b) previous traumatic MVA (68.8%), and (c) prior PTSD related to MVA (6.5%). In this study, none of the injured workers had experienced an MVA within the past 5 years or had previously experienced PTSD subsequent to MVA. Further, injured workers with PTSD differed significantly from injured workers without PTSD only on measures of subjective pain and self-rated depression. Those with and those without PTSD did not differ significantly on basic schemas unrelated to motor vehicles, on MVRs, or on beneficial social interactions.

As previously noted in this section, the CS group was excluded from group comparisons on the CAPS. Participants in the CS group were nevertheless screened for PTSD. Based on the prevalence rates reported in the literature review section of this study, some PTSD symptomatology was expected in the CS group. Two (10%) of the 20 CS participants met criteria for PTSS related to fatal MVAs experienced 254 months and 360 months prior to participation in the study. Similarly, a control group used by Blanchard and Hickling (1997) included 2 participants who had been involved in MVAs with fatalities. The two cases of PTSS in this study were deemed to be representative of the larger community. They formed part of a comparison group, not the target groups. Further, 68.8% of the participants who formed the control group in the Blanchard and Hickling study reported experiencing at least one traumatic event, including traumatic MVA (51.6%), no earlier than 1 year prior to assessment, whereas 60% of the CS participants in this study reported no prior experience of significant traumatic event, 40% reported no previous history of MVA, and none had experienced an MVA within the past 5 years. Thus all CS participants were included in the study, regardless of PTSS status.

Finally, 1 IW participant misinterpreted the instructions for the IES. For that reason, the validity of that IES was questioned. That participant was subsequently excluded from analyses involving that measure.

Data Analysis Strategy

Frequency statistics were used to describe the general characteristics of the sample. Although the number of general characteristics reported in this study was fairly large, it allows for: (a) an overview of factors, some not usually reported, that may impact on cognitive processes; and (b) comparison with other studies. Exploratory chi square analyses (Fisher's exact test reported for 2x2 tables) were reported for some of the characteristics. Group comparisons on the more widely reported characteristics are reported as group demographics.

A number of preliminary analyses and main analyses were undertaken in this investigation. As recommended by Tabachnick and Fidell (1996), a Bonferroni correction was applied to each set of analyses to control for type I error. The Bonferroni adjustment was made by dividing the alpha level (.05) by the number of analyses performed. The method of Bonferroni adjustment used in this study was more liberal than adopting an overall significance level of .001 for the various sets of analyses (Stevens, 1986) but more stringent than applying the modified Bonferroni correction described by Keppel (1991). The Bonferroni correction applied in this study was chosen because it maintained alpha at .05 across all tests. Furthermore, the adjustment made in this study is consistent with that made by Bryant and Harvey (1998) and Ehlers et al. (1998) in recent studies of MVA survivors and Beck, Steer, Ball, et al. (1996) in a study of outpatients diagnosed with depression, that used Bonferroni corrected alphas of .003 (i.e., .05/17), .002 (i.e., .05/24), and .0025 (.05/20) respectively. The most stringent Bonferroni correction used in Study 2 was .005 (i.e., .05/10) for group demographics. The specific Bonferroni adjustments assigned to each set of analyses are noted, as appropriate, in the results section. To facilitate comparisons at alpha levels other than the .05 level adopted in this study or the use of alternative Bonferroni corrections, exact probability values obtained for each analysis are reported.

For the preliminary analyses, either a one-way analysis of variance (ANOVA) or a *t* test was used to (a) confirm expected group differences on the classification measure (i.e., CAPS); and (b) to validate PTSD classification through comparisons of the three clinical groups on a number of corroborating measures. As recommended by Meichenbaum (1994), multiple measures (i.e., CAPS, IES, AFQ avoidance subscale) were used for the assessment of PTSD. Although it was expected that the PTSD status of some participants would differ according to the classification

measure, significant group differences were expected on all three classification measures. Significant group differences were further examined using Tukey post hoc tests. The rationale for using Tukey post hoc tests was that the error rate is held constant over all pairwise comparisons. In addition, the Tukey test is more liberal than the Scheffé test, and Tabachnick and Fidell (1996) recommend the use of less stringent tests when possible. However, homogeneity of variance is assumed for post hoc Tukey tests. As recommended by Kirk (1995), Dunnett *T* tests were used to test all pairwise contrasts when homogeneity of variance was violated. Dunnett's *T* tests also control familywise type I error rate at nominal alpha.

A separate set of analyses was conducted with the three clinical groups on the IES subscales (i.e., avoidance and intrusion) and with the two MVA survivor groups on AFQ nervousness subscale to confirm expected group differences on specific aspects of distress related to the traumatic events experienced by those participants. Further, any group differences on these specific aspects of distress would provide some initial support for some of the underlying assumptions of this study's conceptualization of PTSD in MVA survivors.

Group demographics were examined using ANOVAs, chi square analyses, or *t* tests as appropriate. Significant group differences were further examined using Tukey post hoc tests. Dunnett *T* tests were used for post hoc comparisons when homogeneity of variance was violated.

Psychometric properties of the MVRS were examined prior to conducting the main analyses. Frequency and reliability statistics were conducted. Correlations with other measures were also examined.

Hypothesis 1 was tested using a one-way four-group multivariate analysis of variance (MANOVA) on two DVs: SQ and MVRS. The independent variable (IV) was group status. Multivariate statistics were chosen to test this hypothesis because the correlations between the DVs exceeded .30. Significance of main effects was determined using Wilks' Lambda. Use of this criterion is favored when there is more than one degree of freedom (*df*) and group sizes are equal (Tabachnick & Fidell, 1996). Stepdown analysis is recommended when the DVs are correlated (Tabachnick and Fidell, 1996), as was the case in this study. Therefore, Roy-Bargman stepdown analysis was conducted. As described in Tabachnick and Fidell (1996), the first dependent variable

(DV) entered into the analysis is tested in ANOVA. Each of the remaining DVs is tested with the higher priority DVs as covariates. This determines the importance of each successive DV with the effects of the higher priority DVs eliminated. Although Tabachnick and Fidell (1996) recommend the use of an adjusted alpha of .025 for each of the DVs used in the stepdown analysis, Stevens (1986) recommends a more liberal approach. As recommended by Stevens (1986), alpha was set at .05 for the highest priority variable and .025 for the lower priority variables. In this study, the SQ was entered as the higher priority DV. The MVRS was entered as the lower priority DV. The rationale for the ordering of the dependent variables, consistent with the recommendation of Stevens (1986), was that, if the MVRS was distinct from the SQ, the four groups should differ significantly on the MVRS, even when any effects of the more basic schemas were eliminated. Any DVs achieving significance on the Roy-Bargman stepdown analyses were subjected to post hoc Tukey tests.

Hypothesis 2 was tested using a series of one-way ANOVAS with appropriate Bonferroni adjustment. There were two reasons for using univariate statistics to test this hypothesis. First, the CS group was excluded from group analyses on the measure of perceived disability (i.e., PDI). Second, significant group differences on measures of subjective pain, perceived disability, and self-reported depression severity determined which variables would be entered as covariates in the testing of Hypothesis 3. Significant group differences were further examined using Tukey post hoc tests. Within-group mean differences for sex and for PTSD status on the BDI-II subscales were tested using *t* tests.

Hypothesis 3 was tested using a one-way four-group multivariate analysis of covariance (MANCOVA) on two DVs entered into the analyses in the following order: (1) SQ, and (2) MVRS. The IV was group status. Roy-Bargman stepdown analysis was also conducted. The rationale is the same as that used for conducting the MANOVA that tested Hypothesis 1. The MANCOVA allowed for adjustment for significant group differences on two covariates: subjective pain and self-rated depression severity. Perceived disability was not entered as a covariate because, as previously noted, the CS group was excluded from group analyses on that variable. Further, for the three clinical groups, the PDI was highly correlated with the SF-MPQ ($r = .72$) and the BDI-II ($r = .69$). The use of highly intercorrelated covariates is not recommended

(Tabachnick & Fidell, 1996). Education was not entered as a covariate because the IW control group differed only from one group (i.e., MVA non-PTSD) on that variable. Further, given the nature of the IW group, participants in that group were expected to report lower levels of education than did others in the study. The acceptable number of covariates for use in the MANCOVA was determined according to the guidelines (no. of covariates + no. of groups - 1 / sample size = $< .10$) found in Stevens (1986). Homogeneity of regression (i.e., no interaction between the covariates and the groups) was interpreted using Wilks' Lambda. The linear relationship of the SF-MPQ and the BDI-II with the combination of dependent variables was examined through the within effect of MANCOVA (interpreted using Wilks' Lambda) to determine if the inclusion of the covariates was appropriate.

Hypothesis 4 was tested using Pearson correlations. Hypothesis 5 was tested using a one-way two-group analysis of variance (ANOVA). Pain, disability, and depression were negatively correlated with the CSQ. Therefore, to test Hypothesis 6, analyses of differences between MVA survivors with PTSD and MVA survivors without PTSD on the measure of perceived beneficial social interactions were reconducted using a one-way two-group analysis of covariance (ANCOVA) with pain and depression entered as covariates. As was the case for Hypothesis 3, the PDI was not entered as a covariate in these analyses because it was highly correlated with both pain and depression. In addition, the use of only two covariates was acceptable according to the guidelines (no. of covariates + no. of groups - 1 / sample size = $< .10$) found in Stevens (1986). The linear relationship of the BDI-II with the CSQ was examined through the within effect of the ANCOVA to determine if the inclusion of the SF-MPQ and the BDI-II as covariates was appropriate.

Data Screening

The SPSS package (SPSS Inc., 1995) was used to conduct all statistical analyses. Data were screened for accuracy of data entry, missing data, outliers, and assumptions of univariate and multivariate statistics used in this study. Estimates of internal consistency based on Cronbach's coefficient alpha were obtained for all measures. The interrelationships among the variables of interest and the covariates were also examined. The definitions, rationales, and

recommendations presented in this data screening section have been drawn from Tabachnik and Fidell (1996).

Data Accuracy and Missing Data

Variables were examined for accuracy and missing values through visual inspection and frequency statistics. Missing values were recoded to the item group mean only if the number of missing values on the particular measure did not exceed 10% of the total number of items.

Outliers

Univariate outliers. Within-group casewise residuals were examined for extreme scores on each of the measures used in this study. Those cases with standardized scores which exceeded 3.29 ($p < .001$, two-tailed test) were recoded to one unit larger or smaller than the next most extreme case. This was done to preserve score differences and to reduce outlier impact.

Multivariate outliers. Prior to multivariate analyses, within-group multivariate outliers were sought with the use of Mahalanobis distances ($p < .001$). No multivariate outliers were identified for any of the combinations of variables entered in the various multivariate analyses which tested the hypotheses in this study.

Normality, Linearity, and Homoscedasticity

ANOVA (ANCOVA) and MANOVA (MANCOVA) are robust to violations of normality if sample sizes are equal and no less than 20 in each cell. All but two variables (i.e., demographic variables), examined within groups, were within the normal range for skewness and kurtosis. Transformations of the two variables were not made because the variables were entered into analyses which are robust to violations of normality. Further, non-transformation of the variables facilitated interpretation and comparison to previous research.

Linearity was assessed by inspecting bivariate within-group scatterplots. Visual inspection of the scatterplots suggested that the DVs and the covariates were linearly related in each group.

Homogeneity of Variance and Homogeneity of Variance-Covariance Matrices

ANOVA (ANCOVA) may not be as robust to violation of homogeneity of variance as previously thought. Given that most tests of homogeneity of variance are still considered too rigorous because of their sensitivity to violations of normality, F_{max} (i.e., ratio of the largest cell variance to the smallest) was used to assess homogeneity of variance for analyses with significant

Levene tests. Homogeneity of variance was only deemed to be violated when F_{max} exceeded 10 (criterion used for equal sample sizes). For analyses of variables that violated the assumption of homogeneity of variance tested with F_{max} , interpretation of significance was made at the more stringent alpha level of .025. Although an alpha level of .025 may appear to be quite conservative, especially after Bonferroni corrections are applied, it is still more liberal than the alternative recommended alpha of .01.

For the multivariate analyses, homogeneity of variance was tested using Box's M . As recommended, significance was tested at $p < .001$ because Box's M is a very stringent test. No violations of homogeneity of variance-covariance matrices were found in this study.

Multicollinearity and Singularity

Pearson correlations between variables were examined to detect multicollinearity and singularity. All correlations were below .90. In addition the log determinant of the pooled within-cell correlation matrix for each multivariate analysis was examined. All values were well above 0, suggesting that there was no problem with multicollinearity.

Results

Preliminary Analyses

Data Screening

Missing data and univariate outliers. A total of 10 missing data points, spread almost equally among the 4 participant groups, were found on relevant measures. The missing values were: (a) three scale items for perceived disability ($n = 1$ in MVA non-PTSD group; $n = 2$ in MVA PTSD group), (b) one item for the IES avoidance subscale ($n = 1$ in MVA PTSD group), (c) two items for basic trust ($n = 2$ in IW group), and two items for motor-vehicle related schemas ($n = 1$ each in the MVA PTSD group and IW group). As recommended by Tabachnik and Fidell (1996), all missing values were recoded to the group item mean.

Univariate outliers were found on: (a) the BDI-II for 1 MVA non-PTSD participant and 1 CS participant, (b) the IES avoidance for 1 MVA non-PTSD participant; and (c) the BDI-II-CA for 1 CS participant. Univariate outliers were also found on two demographic variables: (a) number of lifetime MVAs (1 MVA non-PTSD participant), and (b) time since MVA (1 MVA PTSD participant). Univariate outliers were recoded to one unit larger or one unit smaller than the next most extreme case. It was not considered necessary to exclude those with missing or extreme scores because the total number of items recoded due to missing data or univariate outliers was relatively small (i.e., representing 0.16% of the total 10,196 data points on the main measures).

Univariate normality. Variables were also examined for univariate normality. Skewness was significant for time since MVA in the MVA non-PTSD group ($z = 3.38, p = .001$). Corrections were not made for non-normality because the analyses in which these variables were used in this study were robust to non-normality (Stevens, 1986).

Interrelationships. Prior to conducting analyses to test the hypotheses, Pearson correlations were conducted in order to examine the relationships among the measures to be entered in each set of analyses. Results can be found in Tables 2 and 3.

General Characteristics of the Sample

The final sample ($N = 80$) consisted of 29 (36.3%) males and 51 (63.8%) females. Participants' ages ranged from 20 to 63 ($M = 41.54, SD = 11.23$). All participants were born in

Table 2
Intercorrelations Among Schema Measures

Measure	MVRS	SQ	Mistrust	Vulnerability
MVRS	—	.46*	.36*	.49*
SQ		—	.92*	.92*
Mistrust			—	.69*
Vulnerability				—

Note. MVRS: Motor Vehicle-Related Schemas; SQ: Schema Questionnaire. $N = 80$. Bonferroni corrected alpha level = .008 (i.e., .05/6).

* $p < .008$.

Table 3
Intercorrelations Among Measures Entered in Hypotheses 1 to 5

Measure	MVRS	SQ	SF-MPQ	BDI-II	PDI	CSQ
MVRS ^a	—	.46*	.38*	.39*	.36*	-.47*
SQ ^a		—	.41*	.64*	.39*	-.51*
SF-MPQ ^a			—	.64*	.72*	-.59*
BDI-II ^a				—	.69*	-.68*
PDI ^b					—	-.62*
CSQ ^c						—

Note. MVRS: Motor Vehicle-Related Schemas; SQ: Schema Questionnaire; SF-MPQ: Short-Form McGill Pain Questionnaire; BDI-II: Beck Depression Inventory II; PDI: Pain Disability Index; CSQ: Crisis Support Questionnaire. Bonferroni corrected alpha level = .0045 (.05/11).

^a*N* = 80. ^b*N* = 60. ^c*N* = 40.

**p* < .0045.

Canada ($n = 71$, 88.8%) or had resided in the country for a number of years ($n = 9$, 11.2%; no. of years in Canada ≥ 19). With two exceptions (i.e., 1 Middle-Eastern, 1 East Indian) the sample was Caucasian. Consistent with the linguistic characteristics of the area, many participants were bilingual or trilingual ($n = 48$, 60.0%). Overall, the sample was well-educated ($M = 14.74$ years of schooling, $SD = 2.60$, *range* = 8-20). More than half of the participants were married or in a common-law relationship ($n = 48$, 60.0%); the remainder of the sample consisted of single participants ($n = 20$, 25.0%) and separated or divorced participants ($n = 12$, 15.0%). The majority of participants ($n = 53$, 65.4%) had one or more children. All but 12 participants (14.8%) had experienced at least one significant lifetime traumatic event (including MVA) within the past 3 to 360 months ($M = 58.37$, $SD = 62.56$) and all but 14 (19.8%) of the participants had been involved in at least one lifetime MVA within the past 3 to 324 months ($M = 79.40$, $SD = 83.23$).

Characteristics that may impact on the interpretation of group differences among MVA survivors were examined. The Bonferroni correction for this set of chi square analyses was $.05/4 = .013$. Within the sample of MVA survivors, few participants in either the non-PTSD group ($n = 3$, 15%) or the PTSD group ($n = 2$, 10%) had been involved in single vehicle crashes, $\chi^2 (N = 40)$, $p = 1.00$. A majority of the MVA survivors had been the sole occupant of the vehicle at the time of the accident (non-PTSD: $n = 11$, 55%; PTSD: $n = 13$, 65%), $\chi^2 (N = 40)$, $p = .748$. No significant group differences were found between the two MVA groups for injury severity, $\chi^2 (N = 40)$, $p = .025$ or injury to other occupants of the MVA survivor's vehicle, $\chi^2 (N = 40)$, $p = .34$. However, compared to MVA survivors without PTSD, MVA survivors with PTSD reported a significantly higher incidence of chronic pain related to injuries sustained in the MVA, $\chi^2 (N = 40)$, $p = .008$. Two of the MVA survivors, one with PTSD and one without PTSD, considered themselves responsible for the crash. Only 1 MVA survivor with PTSD (57 months post-MVA) experienced an MVA involving fatalities.

Employment status was also examined using chi-square analyses with a Bonferroni corrected alpha level (i.e., $.05/3 = .017$). Significant group differences were found on current employment, $\chi^2 (6, N = 80) = 40.43$, $p < .001$. Compared to the MVA PTSD group ($n = 14$, 70%) and the IW group ($n = 16$, 80%), fewer participants in the MVA non-PTSD group ($n = 1$, 5%) and the CS ($n = 2$, 10%) group were currently unemployed. Yet, prior to the traumatic

accident, all but 4 MVA survivors (i.e., 2 with PTSD, 2 without PTSD) were employed.

Group Classification

Group differences and corroboration. According to classification on the CAPS, an equal number of MVA survivors who participated in the study either met or failed to meet the criteria for PTSD. For the IW group, 9 (45%) participants met criteria for PTSD and 3 (15%) participants met criteria for PTSS (see Figure 1). Univariate analyses were conducted to confirm expected differences among the 2 MVA groups and the IW group with respect to the CAPS. The IES and the AFQ avoidance measures were used as corroborating measures to validate group classification based on the CAPS. For these analyses: (1) group sizes were about equal; (2) no univariate outliers were found; and (3) univariate normality was respected. Analyses to assess differences among groups (MVA non-PTSD, MVA PTSD, IW) for the CAPS and the IES total score, were conducted using ANOVAs. The analysis to assess differences between the two MVA groups for the AFQ avoidance subscale was conducted using a *t* test. A Bonferroni corrected alpha level (i.e., $.05/3 = .016$), based on the number of univariate tests, was used to control for experimentwise error (Tabachnick & Fidell, 1996). The Levene test for assumption of homogeneity of variances was violated on all three measures. Values of $F_{\max}$ for the CAPS and the IES were 8.85 and 8.14, respectively, therefore, no further adjustment of alpha level was required for those measures. For the AFQ avoidance subscale, significance was interpreted using results for unequal variances. Group means and standard deviations for classification and corroborating measures are reported in Table 4. Significant group differences emerged with respect to the CAPS, $F(2, 57) = 56.29, p < .001$. Post hoc Tukey tests revealed that the MVA non-PTSD group, the MVA PTSD group, and the IW group differed significantly from one another on the CAPS. The MVA PTSD group scored significantly higher on the CAPS than did the other two groups. The IW group scored significantly higher than did the MVA non-PTSD group.

Significant group differences emerged with respect to the IES total score, $F(2, 56) = 24.38, p < .001$. Post hoc Tukey tests revealed that the MVA PTSD group differed significantly from the MVA non-PTSD group and the IW group on the IES. The MVA PTSD group reported

Table 4
*Means and Standard Deviations for Clinical Groups on Classification and Group Assignment
 Corroborating Measures*

Measure	Total	Group		
		MVA	MVA	IW
	Sample (<i>N</i> = 60)	Non-PTSD (<i>n</i> = 20)	PTSD (<i>n</i> = 20)	(<i>n</i> = 20)
CAPS				
<i>F</i> (2, 57) = 56.29, <i>p</i> = < .001				
<i>M</i>	37.99	8.60	70.48	34.90
<i>SD</i>	31.38	8.68	16.91	25.82
IES Total ^a				
<i>F</i> (2, 56) = 24.38, <i>p</i> = < .001				
<i>M</i>	25.57	8.10	42.02	26.63
<i>SD</i>	20.67	7.28	15.34	20.78
AFQ Avoidance ^b				
<i>t</i> (28) = -7.90, <i>p</i> = < .001				
<i>M</i>	24.32	8.70	39.36	–
<i>SD</i>	20.07	8.10	15.72	–

Note. CAPS: Clinician-Administered PTSD Scale; IES: Impact of Event Scale; AFQ: Accident Fear Questionnaire. Dashes indicate that the group was excluded from group analyses on that measure. Bonferroni corrected alpha level = .016 (i.e., .05/3).

^aFor the IW group, *n* = 19. ^bDegrees of freedom and *t* statistic are based on unequal variances (*N* = 40).

significantly higher levels of distress (i.e., avoidance and intrusion) than did both the MVA non-PTSD group and the IW group. The IW group reported significantly higher levels of distress than did the MVA non-PTSD group. Based on the cut-off score of >30 on the IES (Bryant & Harvey, 1995), all participants in the MVA non-PTSD group would have remained in the MVA non-PTSD group, whereas 5 (25%) participants in the MVA PTSD group would have been placed in the MVA non-PTSD group. Of those MVA survivors with PTSD who did not meet the cut-off score, 3 (15%) participants scored 21-30 and 2 (10%) participants scored 20 or lower. Hence, a total of 12.5% of all MVA survivors would have been classified differently had PTSD classification been based on the IES.

With respect to the AFQ avoidance subscale, the MVA PTSD group scored significantly higher than did the MVA non-PTSD group, $t(28) = -7.90, p = < .001$. Using either the mean score of 24 or the median score of 18 obtained for the combined MVA groups in this study, 1 (5%) MVA participant without PTSD and 2 (10%) MVA participants with PTSD, or a total of 7.5% (3) of all MVA survivors would have been grouped differently had the classification measure been the AFQ avoidance rather than the CAPS.

Analyses were also conducted to examine the intercorrelations among the classification and the corroborating measures. The intercorrelations were as follows: (a) CAPS and IES $r = .87, p = < .001$ for the two MVA groups and the IW group; (b) CAPS and AFQ avoidance $r = .79, p = < .001$ for the two MVA groups; and (c) IES and AFQ avoidance $r = .67, p = < .001$ for the two MVA groups.

Specific aspects of distress. ANOVAs were conducted to assess differences among the three clinical groups with respect to current distress measured on the IES avoidance subscale and IES intrusion subscale. A t test was conducted to assess differences between the MVA PTSD group and the MVA non-PTSD group with respect to AFQ nervousness. A Bonferroni corrected alpha level (i.e., $.05/3 = .016$), based on the number of univariate tests, was used to control for experimentwise error. The Levene test for assumption of homogeneity of variances was violated on both the IES avoidance subscale and the IES intrusion subscale. Hartley's test of variance of homogeneity was acceptable for the IES intrusion subscale ($F_{\max} = 7.10$) but not for the IES avoidance subscale ($F_{\max} = 17.99$). Therefore, as recommended by Tabachnick and Fidell (1996),

a more stringent alpha level (i.e., $.05/3/2 = .008$) was used to assess differences on the IES avoidance subscale. All other assumptions of ANOVA were met.

Significant group differences emerged on mean IES avoidance, $F(2, 56) = 27.69, p < .001$, and IES intrusion, $F(2, 56) = 18.00, p < .001$. Post hoc Dunnett T3 tests revealed that the MVA PTSD group and the IW group reported significantly higher IES avoidance than did the non-PTSD group. The MVA PTSD group and the IW group did not differ significantly from one another with respect to IES avoidance. With respect to IES intrusion, post hoc Tukey tests revealed that the MVA non-PTSD group reported lower levels than did both the MVA PTSD group and the IW group. The MVA PTSD group and the IW group did not differ significantly from one another with respect to IES intrusion. The MVA PTSD group also differed significantly from the MVA non-PTSD group with respect to accident nervousness, $t(38) = -7.32, p < .001$, with the MVA PTSD group reporting significantly more accident nervousness than the MVA non-PTSD group. Group means and standard deviations are reported in Table 5.

Summary. Overall, the findings on the IES and the AFQ, as well as on the subscales for both measures, did corroborate the classification of the participants in this study. The non-significant differences between the MVA PTSD group and the IW group found on the IES were consistent with the finding that 12 injured workers met the classification for PTSS or PTSD on the CAPS.

Group demographics

Depending on whether the data were continuous or discrete, group differences among the MVA PTSD group, the MVA non-PTSD group, the IW group, and the CS group were analyzed using a series of one-way ANOVAs or chi square analyses. For analyses of differences between two groups, t tests were used. A Bonferroni corrected alpha level (i.e., $.05/10 = .005$), based on the number of univariate tests, was used to control for experimentwise error.

Differences among the four groups with respect to age, education, number of children, assessed using one-way ANOVAs. With the exception of the personal history rating scale, the variables were normally distributed. No univariate outliers were found. Although the Levene test for assumption of homogeneity of variances was violated on age, Hartley's test of variance of homogeneity was acceptable ($F_{\max} = 4.11$). No significant differences among the four groups

Table 5

Means and Standard Deviations for Clinical Groups on Measures of Specific Aspects of Distress

Measure	Group		
	MVA Non-PTSD (<i>n</i> = 20)	MVA PTSD (<i>n</i> = 20)	IW (<i>n</i> = 19)
IES Avoidance			
<i>F</i> (2, 56) = 27.69, <i>p</i> = < .001			
<i>M</i>	2.30	20.12	11.79
<i>SD</i>	2.47	7.67	10.49
IES Intrusion			
<i>F</i> (2, 56) = 18.00, <i>p</i> = < .001			
<i>M</i>	5.05	21.90	14.84
<i>SD</i>	4.49	8.87	11.96
AFQ Nervousness			
<i>t</i> (38) = -7.32, <i>p</i> = < .001			
<i>M</i>	3.15	6.50	–
<i>SD</i>	1.31	1.57	–

Note. IES: Impact of Event Scale; AFQ: Accident Fear Questionnaire. Dashes indicate that the group was excluded from analyses on that measure. Bonferroni corrected alpha level = .016 (.05/3)

were found with respect to: (1) age $F(3, 76) = .46, p = .714$, (2) number of children, $F(3, 76) = 2.44, p = .070$, (3) number of lifetime MVAs, $F(3, 76) = 4.42, p = .006$, (4) personal history rating scale, $F(3, 76) = 4.43, p = .006$, or (5) family history rating scale, $F(3, 76) = 1.75, p = .164$. Significant differences emerged across groups with respect to mean education, $F(3, 76) = 8.02, p < .001$. Post hoc Tukey tests revealed that the IW group was less educated than the MVA non-PTSD group. The MVA PTSD group and the CS group did not differ significantly from one another, nor did they differ significantly from the MVA non-PTSD group or the IW group. Results for continuous data on general demographic variables can be found in Table 6.

To assess differences among groups with respect to time since last MVA, the sample was split into an MVA survivors group (i.e., both MVA groups) and a non-MVA survivors group (i.e., IW group and CS group) and a t test was conducted to assess differences between the two groups. Significant differences in the number of months elapsed since the last MVA emerged between the MVA survivors ($M = 34.75, SD = 33.56$) and the non-MVA survivors ($M = 151.16, SD = 86.62$), $t(29) = -6.42, p < .001$. MVA survivors had experienced an MVA more recently than non-MVA survivors. A t test was conducted to assess differences between the two groups of MVA survivors with respect to time since last MVA. There were no significant differences between the MVA non-PTSD group ($M = 32.15, SD = 38.31$) and the MVA PTSD group ($M = 37.35, SD = 28.81$) with respect to time since last MVA, $t(38) = -.48, p = .630$.

Group differences on categorical data were explored using chi-square analyses. No significant group differences were found among the four groups on sex, $\chi^2(3, N = 80) = 8.38, p = .039$ or marital status, $\chi^2(3, N = 80) = .833, p = .841$.

Psychometric Properties of the MVRs

Scores on the MVRs (possible range of scores = 23 to 138) ranged from 44 to 125 ($M = 81.35, SD = 19.08$). The lower range of scores on the MVRs for Study 2 was similar to that for Study 1 at both Time 1 and Time 2. The upper range of scores on the MVRs for Study 2 was higher than that for Study 1 (at both test administration times), suggesting that some participants in Study 2 may have rated greater agreement with maladaptive statements on the MVRs than did the student sample, consistent with the fact that these were drawn from clinical samples. Corrected item-total correlations for the MVRs ranged from .22 to .64, Cronbach's coefficient

Table 6
Means and Standard Deviations for Continuous Data on General Demographic Variables

Measure	Group				Statistic
	MVA	MVA	IW	CS	
	Non-PTSD (<i>n</i> = 20)	PTSD (<i>n</i> = 20)	(<i>n</i> = 20)	(<i>n</i> = 20)	
Age					
<i>M</i>	39.15	43.15	42.25	41.60	<i>F</i> (3, 76) = .46, <i>p</i> = .714
<i>SD</i>	14.96	10.90	7.38	10.88	
Education					
<i>M</i>	16.45	14.40	12.95	15.15	<i>F</i> (3, 76) = 8.02, <i>p</i> = < .001*
<i>SD</i>	2.72	2.26	1.70	2.43	
Number of Children					
<i>M</i>	1.10	1.30	2.15	1.36	<i>F</i> (3, 76) = 2.44, <i>p</i> = .070
<i>SD</i>	1.37	1.08	1.39	1.36	
Lifetime MVAs					
<i>M</i>	2.30	3.00	1.60	1.40	<i>F</i> (3, 76) = 4.42, <i>p</i> = .006
<i>SD</i>	1.22	1.78	1.64	1.50	
Family History of Psychiatric Illness and Physical Disabilities					
<i>M</i>	.80	1.75	1.20	1.30	<i>F</i> (3, 76) = 1.75, <i>p</i> = .164
<i>SD</i>	1.24	1.62	1.11	1.26	
Personal History of Significant Loss					
<i>M</i>	1.90	3.45	3.60	2.65	<i>F</i> (3, 76) = 4.43, <i>p</i> = .006
<i>SD</i>	1.37	1.39	2.65	2.01	

Note Bonferroni corrected alpha level = .005 (i.e., .05/10) for the set of analyses that also included results for non-significant differences on categorical data (i.e., sex, marital status, and time since last MVA for MVA survivors and non-MVA survivors) as well as significant results for time since last MVA. Results for categorical data are reported in the text.

* $p < .005$.

alpha = .89. With the exception of the two lowest items (item 3, $r = .31$, item 9, $r = .22$), all corrected item-total correlations were above .35. The small standard deviations for items 3 and 9 indicate low variability in responses and lower potential for correlation. Different wording on those items may have resulted in greater variance. Item means and corrected item-total correlations can be found in Table 7. The MVRS was significantly correlated with the SQ total score, the SQ mistrust subscale, the SQ vulnerability subscale, the MPQ, the BDI-II, the PDI, and the CSQ. Intercorrelations for these measures can be found in Tables 2 and 3.

Main Analyses

Hypothesis 1

A one-way four group between-subjects MANOVA with Roy-Bargman stepdown analysis was used to test group differences on schemas specific to motor vehicles after adjusting for any effects of the more basic schemas. For these analyses, the SQ and MVRS were entered (in that order) as DVs and group status was entered as the IV. Data were checked for assumptions relevant to MANOVA. For these analyses, group sizes were equal. No univariate or multivariate outliers were found within the groups at $p = .001$. The assumption of normality was met. Visual inspections of scatterplots suggested linear relationships among the dependent variables. Box's M , $F(9, 66191) = 1.28$, $p = .241$, indicated that the assumption of homogeneity of variance-covariance matrices was met.

With the use of Wilk's criterion, it was determined that the four groups differed significantly on the combination of dependent variables, $F(6, 150) = 5.38$, $p < .001$, effect size = .18. A Roy-Bargman stepdown analysis was conducted to determine if there were any differences among groups on the MVRS after adjustment was made for general basic schemas measured by the SQ. Results of the Roy-Bargman stepdown indicated that the four groups differed significantly on the SQ, stepdown $F(3, 76) = 6.45$, $p = .001$. The four groups also differed significantly on the MVRS, stepdown $F(3, 75) = 4.42$, $p = .006$ (adjusted α level = .025), even after making adjustments for the higher priority DV (i.e., SQ). Univariate analyses and adjusted means on the SQ and the MVRS can be found in Table 8.

Post hoc Tukey tests revealed significant differences among groups for the SQ, $F(3, 76) = 6.45$, $p = .001$. The MVA PTSD group endorsed significantly higher levels of early maladaptive

Table 7

Item Means and Corrected Item-Total Correlations for the MVRs

Item	Item <i>M</i>	Item <i>SD</i>	Corrected Item-Total Correlation
1	3.58	1.28	.56
2	4.30	1.49	.46
3	1.82	1.23	.31
4	3.41	1.71	.37
5	4.36	1.30	.51
6	3.61	1.76	.38
7	3.00	1.32	.59
8	2.58	1.55	.52
9	4.85	1.14	.22
10	3.45	1.68	.61
11	3.99	1.45	.38
12	4.21	1.35	.46
13	2.62	1.65	.64
14	3.02	1.92	.63
15	3.21	1.46	.42
16	4.49	1.36	.43
17	3.31	1.61	.58
18	3.81	1.56	.62
19	3.44	1.52	.58
20	3.71	1.65	.46
21	4.00	1.74	.60
22	3.24	1.20	.44
23	3.32	1.60	.45

Note. Cronbach's coefficient alpha is .89.

Table 8

Univariate Analyses and Adjusted Means on Measures of Basic Schemas (SQ) and Motor Vehicle-Related Schemas (MVRS) for Hypothesis 1

Measure	Group			
	MVA	MVA	IW	CS
	Non-PTSD (<i>n</i> = 20)	PTSD (<i>n</i> = 20)	(<i>n</i> = 20)	(<i>n</i> = 20)
Schema Questionnaire				
Univariate $F(3, 76) = 6.45, p = .001$				
Stepdown $F(3, 76) = 6.45, p = .001$				
Observed <i>M</i>	60.15	87.05	66.76	56.80
MVRS				
Univariate $F(3, 76) = 8.90, p < .001$				
Stepdown $F(3, 75) = 4.42, p = .006$				
Observed <i>M</i>	74.70	98.00	77.45	75.25
Adjusted <i>M</i>	76.32	93.84	77.65	77.59

Note. Alpha level for SQ stepdown F is .05. Bonferroni corrected alpha level for MVRS stepdown F is .025 (.05/2). All results are significant at the stated Bonferroni corrected alpha levels.

vulnerability schemas than did the MVA non-PTSD group and the CS group. The MVA PTSD group did not differ significantly from the IW group, the majority of whom met the classification for PTSS or PTSD. The MVA non-PTSD group, the IW group, and the CS group did not differ significantly from one another with respect to the SQ.

Post hoc Tukey tests revealed significant differences among groups for the MVRs, $F(3, 76) = 8.90, p = < .001$. The MVA PTSD group endorsed significantly higher levels of maladaptive MVRs than did the MVA non-PTSD group, the IW group, and the CS group. The MVA non-PTSD group, the IW group, and the CS group did not differ significantly from one another with respect to the MVRs.

With no adjustment for any significant group differences on other factors such as pain and depression, these results suggest a possible association between the development of PTSD subsequent to traumatic MVA and the particular set of rules used for interpreting vulnerability regarding general experiences as well as experiences related to road traffic situations. Although injured workers do not differ significantly from MVA survivors with PTSD in their appraisal of vulnerability relevant to general experiences, neither do they differ significantly from others in Study 2.

Hypothesis 2

A series of one-way ANOVAs were used to test group differences on subjective pain, perceived disability, and self-reported depression. A Bonferroni corrected alpha level of (i.e., $.05/5 = .01$), based on the number of univariate tests was used to control for experimentwise error.

Subjective pain. A one-way ANOVA was conducted to assess group differences among the four groups with respect to subjective pain severity. All assumptions of ANOVA were met. Significant differences emerged across groups with respect to the SF-MPQ, $F(3, 76) = 13.98, p = < .001$. Post hoc Tukey tests revealed that the MVA PTSD group and the IW group reported significantly higher levels of subjective pain than did either the MVA non-PTSD group or the CS group. The MVA PTSD group and the IW group did not differ significantly from one another on the SF-MPQ. Group means and standard deviations are reported in Table 9.

Table 9

Means and Standard Deviations on Psychological Test Measures of Pain, Disability, and Depression Severity

Measure	Total Sample (<i>N</i> = 80)	Group			
		MVA Non-PTSD (<i>n</i> = 20)	MVA PTSD (<i>n</i> = 20)	IW (<i>n</i> = 20)	CS (<i>n</i> = 20)
SF-MPQ					
<i>F</i> (3, 76) = 13.98, <i>p</i> = < .001					
<i>M</i>	16.92	11.50	25.85	23.35	7.00
<i>SD</i>	13.31	11.69	9.15	12.38	10.07
PDI					
<i>F</i> (2, 57) = 35.71, <i>p</i> = < .001					
<i>M</i>	25.39	10.62	46.14	39.40	–
<i>SD</i>	22.41	14.11	11.25	16.50	–
BDI-II Total					
<i>F</i> (3, 76) = 23.41, <i>p</i> = < .001					
<i>M</i>	14.02	5.45	27.50	15.95	5.90
<i>SD</i>	13.45	6.12	12.23	12.42	5.30
BDI-II-C					
<i>F</i> (3, 76) = 13.25, <i>p</i> = < .001					
<i>M</i>	3.89	1.55	8.10	4.50	1.40
<i>SD</i>	4.69	2.46	5.59	4.48	1.60
BDI-II-SA					
<i>F</i> (3, 76) = 24.28, <i>p</i> = < .001					
<i>M</i>	9.98	4.45	19.40	11.45	4.60
<i>SD</i>	8.82	4.39	7.67	8.39	4.10

Note. SF-MPQ: Short-Form McGill Pain Questionnaire; PDI: Pain Disability Index; BDI-II: Beck Depression Inventory-II; BDI-II-C: Beck Depression Inventory-II Cognitive subscale; BDI-II-SA: Beck Depression Inventory-II Somatic-Affective subscale. Dashes indicate that the group was excluded on that measure. Bonferroni corrected alpha level = .01 (i.e., .05/5).

Perceived disability. A one-way ANOVA was conducted to assess group differences among the three clinical groups with respect to perceived disability. All assumptions of ANOVA were met. Significant differences emerged across groups with respect to the PDI, $F(2, 57) = 35.71, p = < .001$. Post hoc Tukey tests revealed that the MVA PTSD group and the IW group reported significantly higher levels of perceived disability than did the MVA non-PTSD group. The MVA PTSD group and the IW group did not differ significantly from one another on the PDI. Group means and standard deviations for the PDI are reported in Table 9.

Self-reported depression. Using Beck et al.'s (1996) suggested cut-off scores for the BDI-II total score, almost half ($n = 9, 45\%$) of the MVA survivors who developed PTSD rated their depression as severe. In comparison, only 3 (15%) participants in the MVA non-PTSD group and 3 participants in the IW group rated their depression as severe. Only 2 (10%) participants in the MVA PTSD group rated their depression as minimal compared to 13 (65%) participants in the MVA non-PTSD group, 10 (50%) participants in the IW group, and 18 (90) participants in the CS group.

A series of one-way ANOVAs were conducted to assess group differences among the four groups with respect to self-reported depression on the BDI-II total score and on the BDI-II subscales: BDI-II-SA and BDI-II-C. The Levene assumption of homogeneity of variances was violated for the BDI-II total score, the BDI-II-SA, and the BDI-II-C. Hartley's test of variance of homogeneity was acceptable for the BDI-II total score ($F_{\max} = 5.49$) and the BDI-II-SA subscale ($F_{\max} = 4.19$), but not for the BDI-II-C subscale ($F_{\max} = 12.17$). Therefore, a more stringent alpha level (i.e., $.05/5/2 = .005$) was used to assess group differences on the BDI-II-C subscale. All other assumptions of ANOVA were met.

Significant differences emerged across groups with respect to reported depression severity on the BDI-II total score, $F(3, 76) = 23.41, p = < .001$. Post-hoc Tukey tests revealed that the MVA PTSD group reported significantly higher levels of depression than did all other groups. The IW group reported significantly higher levels of depression than did the MVA non-PTSD group and the CS group. The MVA non-PTSD group and the CS group did not differ significantly from one another on the BDI-II total score.

Significant differences also emerged across groups with respect to the BDI-II-SA subscale, $F(3, 76) = 24.28, p = < .001$. Post hoc Tukey tests revealed that the MVA PTSD group reported significantly higher levels of somatic-affective symptomatology than all other groups on the BDI-II-SA subscale. The ratings of the IW group were significantly higher than those of both the MVA non-PTSD group and the CS group. The MVA non-PTSD group and the CS group did not differ significantly from one another on the BDI-II-SA subscale. Within groups, no significant mean differences were found for sex on the BDI-II-SA subscale. Within the IW group, no significant mean differences were found for PTSD status.

The groups also differed significantly with respect to the BDI-II-C subscale, $F(3, 76) = 13.25, p = < .001$. Post hoc Dunnett T3 tests revealed significant differences across groups with respect to the BDI-II-C subscale. The MVA PTSD group scored significantly higher than did both the MVA non-PTSD group and the CS group but did not differ significantly from the IW group. No significant differences emerged between the MVA PTSD non-PTSD group, the IW group, and the CS group on the BDI-II-C subscale. No significant within-group mean differences were found for sex or PTSD status (i.e., in the IW group) on the BDI-II-C subscale. Group means and standard deviations are reported in Table 9.

Taken together, the results suggest that MVA survivors who developed PTSD subsequent to MVA fared worse than did other MVA survivors who did not develop PTSD as well as participants in the CS group on measures of pain, disability and total depression. Injured workers, the majority of whom met classification for PTSS or PTSD, were comparable to MVA survivors with PTSD on measure of pain, disability, and cognitive symptoms of depression, but reported significantly less total depression and significantly less severe SA symptoms of depression than did MVA survivors with PTSD. Injured workers reported significantly more depression and more SA symptoms of depression than did MVA survivors without PTSD and participants in the CS group. MVA survivors who did not develop PTSD were most similar to participants in the CS group on all three measures.

Hypothesis 3

A one-way four-group between-subjects MANCOVA was conducted to more fully examine group differences on schemas specific to motor vehicles and their operation. As in Hypothesis 1,

the two DVs were entered in the following order: (1) SQ, and (2) MVRS. The IV was group status. The SF-MPQ and the BDI-II were entered as covariates. For these analyses, education was not correlated with the dependent variables and was therefore eliminated as a covariate. The number of covariates was acceptable according to the guidelines (no. of covariates + no. of groups - 1/ sample size = $< .10$) suggested by Stevens (1986). The linear relationship of the SF-MPQ and the BDI-II with the combination of dependent variables, examined through the within effect of MANCOVA (Wilks' criterion) was significant, $F(4, 146) = 7.56, p = < .001$, indicating that the inclusion of the two measures as covariates was appropriate. Further, using Wilk's criterion, it was determined that the assumption of homogeneity of regression was met, $F(12, 134) = .85, p = .594$, supporting the inclusion of the SF-MPQ and the BDI-II as covariates. For these analyses, group sizes were equal. No univariate or multivariate outliers were found within the groups at $p = .001$. The assumption of normality was met. Visual inspections of scatterplots suggested linear relationships among the dependent variables. Box's M, $F(9, 66191) = 1.28, p = .241$, indicated that the assumption of homogeneity of variance-covariance matrices was met.

With the use of Wilk's criterion, it was determined that the four groups differed significantly on the combination of dependent variables, $F(6, 146) = 2.20, p = .047$, effect size = .08. A Roy-Bargman stepdown analysis was conducted to determine if there were any differences among groups on the two DVs after adjustment was made for subjective pain and self-reported depression. Results of the Roy-Bargman stepdown indicated that the four groups did not differ significantly on the SQ, stepdown $F(3, 74) = .44, p = .722$. The four groups did differ significantly on the MVRS questionnaire, stepdown $F(3, 73) = 4.08, p = .010$, even after making adjustments for the higher priority DV (i.e., SQ), as well as the two covariates (i.e., SF-MPQ and BDI-II). Observed means and means adjusted for the covariates (i.e., adjusted means) can be found in Table 10. Given that the univariate follow-up analyses (i.e., the post hoc Tukey tests) for this hypothesis were conducted as follow-up to Hypothesis 1, they will not be repeated here.

The results of the analyses for Hypothesis 3 differed from those of Hypothesis 1 in that the groups differences on basic maladaptive schemas were no longer significant after adjustment for subjective pain and self-rated depression. However, the results for the MVRS were consistent with those found for Hypothesis 1. Even after adjustment for basic schemas not specific to motor

Table 10

Univariate Analyses and Adjusted Means on Measures of Basic Schemas (SQ) and Motor Vehicle-Related Schemas (MVRS) for Hypothesis 3

Measure	Group			
	MVA	MVA	IW	CS
	Non-PTSD (<i>n</i> = 20)	PTSD (<i>n</i> = 20)	(<i>n</i> = 20)	(<i>n</i> = 20)
Schema Questionnaire				
Univariate $F(3, 74) = 0.44, p = .722$				
Stepdown $F(3, 74) = 0.44, p = .722$				
Observed M	60.15	87.05	66.76	56.80
Adjusted M	71.03	68.86	63.60	67.27
MVRS				
Univariate $F(3, 74) = 4.10, p = .010$				
Stepdown $F(3, 73) = 4.08, p = .010$				
Observed M	74.70	98.00	77.45	75.25
Adjusted M	76.64	94.80	75.21	78.74

Note. Alpha level for SQ stepdown F is .05. Bonferroni corrected alpha level for MVRS stepdown F is .025.

vehicles as well as subjective pain and self-rated depression, significant group differences were found on items thought to reflect the content of a maladaptive schema specific to motor vehicles. Thus the results supported Hypothesis 3.

Hypothesis 4

For the MVA survivor groups, the relationship between beneficial social interactions and schemas germane to road traffic situations was tested with a Pearson correlation. The significant negative correlation ($r = -.47, p = .002$) found between the MVRS and the CSQ supported Hypothesis 4. More precisely, beneficial social interactions appeared to be associated with lower levels of maladaptive distrust and vulnerability specifically related to motor vehicles and the operation thereof.

Hypothesis 5

A two-group one-way ANOVA was conducted to assess differences between the two MVA survivor groups with respect to perceived social interactional influences. All assumptions of ANOVA were met. The MVA PTSD group, reported significantly lower levels of beneficial social interactions than did the MVA non-PTSD group, $F(1, 38) = 22.78, p < .001$. Means and standard deviations can be found in Table 11. The results were consistent with Hypothesis 5. Taken together, the results of Hypotheses 4 and 5 suggest that, for MVA survivors, there is an association between higher levels of maladaptive dysfunctional cognitive processes and lower levels of perceived beneficial social interactions.

Hypothesis 6

A one-way two-group between-subjects analysis of covariance (ANCOVA) was conducted to test Hypothesis 6. The dependent variable was social interactional influences (CSQ). The SF-MPQ and the BDI-II were entered as covariates. The linear relationship of the BDI-II with the CSQ, examined through the within effect of the ANCOVA, was significant, $F(2, 36) = 5.73, p < .01$, indicating that the use of the SF-MPQ and the BDI-II in the ANCOVA was appropriate. Further, the assumption of homogeneity of regression was met, $F(2, 34) = .52, p > .05$. Sample sizes were equal. There were no univariate or multivariate outliers. The assumptions of normality, linearity, homogeneity of variance were met. Results of the ANCOVA indicated that the MVA non-PTSD group did not differ from the MVA PTSD group on social interactional influences

Table 11

Univariate Analyses of MVA non-PTSD and MVA PTSD Groups on a Measure of Social Interactional Influences (CSQ)

Measure	Group		Statistic
	MVA	MVA	
	Non-PTSD	PTSD	
	(<i>n</i> = 20)	(<i>n</i> = 20)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
CSQ			
Observed <i>M</i>	41.90 (5.01)	33.10 (6.54)	<i>F</i> (1, 38) = 22.78, <i>p</i> = < .001
Adjusted <i>M</i>	38.56	36.44	<i>F</i> (1, 36) = .66

Note. CSQ: Crisis Support Questionnaire. Observed means and accompanying *F* are for ANOVA. Adjusted means and accompanying *F* are for ANCOVA.

when subjective pain and severity of depression were adjusted, $F(1, 36) = .66$. Observed means and means adjusted for the covariates (i.e., adjusted means) can be found in Table 11.

Taken together, these findings suggest that higher levels of perceived beneficial social interactions were associated with lower endorsements of maladaptive statements thought to reflect a dysfunctional schema specific to road traffic situations. Although MVA survivors appeared to differ significantly with respect to levels of perceived beneficial social interactions within the 3 months prior to participation in the study, those differences became non-significant after adjustment for pain and depression.

Discussion

First, it was predicted that MVA survivors with PTSD would be characterized by a maladaptive and dysfunctional schema germane to road traffic situations. In the MVA PTSD group, the MVRs schema was expected to be reflected in the endorsement of more extreme items that pertain to specific rules or ways of interpreting road traffic experiences. MVA survivors with PTSD did subscribe to higher levels of maladaptive and dysfunctional schemas relevant to road traffic situations than did others in this study. The design was quasi-experimental, therefore causality cannot be inferred. Nonetheless, the results did suggest that PTSD in MVA survivors is associated with the post-MVA exaggerated interpretation of danger in road traffic situations.

It was further expected that the endorsement of early maladaptive schemas by MVA survivors with PTSD would be significantly different from others in the study prior to adjustment for other influencing factors. The MVA PTSD group and the IW control group subscribed to significantly higher levels of early maladaptive schemas than did other MVA survivors or those in the community sample. The findings for the IW group appear to reflect the PTSD status of the participants in the IW group.

Second, previous research suggests that cognitive processes are associated with the perception of pain, disability, and depression (Beck, Rush, Shaw, & Emery, 1979; Beck et al., 1985; Hanson & Gerber, 1994; Lawson et al., 1990; Sullivan & D'Eon, 1990). Therefore, compared to others, MVA survivors with PTSD were expected to be characterized by higher levels of maladaptive cognitive processing germane to post-MVA sequelae reflected in higher levels of reported subjective pain, perceived disability, and self-reported depression. Whereas MVA survivors with PTSD reported higher levels of pain and disability than did MVA survivors without PTSD and higher levels of pain than did participants in the community sample, MVA survivors with PTSD did not differ significantly from injured workers on those variables.

The differences on pain found for the MVA survivors who developed PTSD are consistent with previous findings of high rates of comorbid pain in individuals who develop PTSD (Koch, 1993; Shalev et al., 1990; Taylor & Koch, 1995). The non-significant differences between the MVA PTSD group and the IW group on measures of subjective pain and perceived disability are consistent with what one might expect, given the PTSD status of the participants in the IW group.

Previous research has demonstrated that injured workers with PTSD report higher levels of somatic symptoms than do injured workers without PTSD (Asmundson et al., 1998).

On a measure of self-rated depression (i.e., BDI-II total score), MVA survivors reported significantly higher levels than did all other participants in this study. The results are consistent with previous investigations that found high rates of comorbid depression in MVA survivors who developed PTSD (Blanchard, Hickling, Taylor, & Loos, 1995; Kuch, Cox, & Drenfeld, 1995). As in the Kuch et al. (1995) study, almost half of the MVA survivors with PTSD in Study 2 were severely depressed. Consistent with previous research that found higher rates of depression in injured workers who developed PTSD than in injured workers who did not develop PTSD (Asmundson et al., 1998), the injured workers in this study rated their depression as more severe than did MVA survivors without PTSD and participants in the community sample. The findings on self-rated depression for both the MVA PTSD group and the IW control group are consistent with previous literature demonstrating that pain and depression often co-exist (Sullivan & D'Eon, 1990; Sullivan, Reesor, Mikail, & Fisher, 1992; Taylor & Koch, 1995). Chronic pain may be a predisposing factor for PTSD (Koch, 1993). Although causality cannot be inferred from the data in this investigation, subjective pain, as well as perceived disability, and depression, all of which may be associated with a maladaptive cognitive process, appear to be associated with PTSD.

Third, it was expected that, compared to others, MVA survivors with PTSD would be characterized by higher levels of maladaptive and dysfunctional schemas germane to road traffic situations even after adjustment for any group differences on potential factors such as pain and depression, and nonspecific early maladaptive cognitions relevant to core vulnerability. The findings supported this hypothesis, suggesting that, in this study, MVA survivors who developed PTSD used a distinct set of templates or rules to evaluate stimuli specific to road traffic situations. Further, the findings were robust, even after the effects of other potentially influencing factors, more specifically, pain and depression, were adjusted.

The findings in Study 2 are consistent with previous research (Harvey, Bryant & Dang, 1998; Warda & Bryant, 1998a) that demonstrated differences in cognitive processing in MVA survivors who developed PTSD and those who did not. The data also suggest that distressed individuals who develop PTSD subsequent to a traumatic event may not engage in adaptive and

functional secondary reappraisal and reinterpretation of stimuli as described by Beck et. al. (1985) and Young (1994, 1999). The maladaptive cognitive processing found in the MVA survivors who developed PTSD is consistent with a rapid-fire style of cognitive processing that: (a) filters stimuli through a danger schema; and (b) is best suited for threatening situations. Cognitive-behavioral clinical protocols for MVA survivors with PTSD target, challenge, and attempt to change this type of cognitive processing (Blanchard & Hickling, 1997; Koch & Taylor, 1995).

One might argue that this maladaptive cognitive processing style developed in response to a number of environmental stimuli both related and unrelated to the traumatic event. For example, Taylor (1998) has surmised that some individuals may be genetically, as well as environmentally, predisposed and primed to developing certain maladaptive cognitive styles. Young (1994, 1999) has suggested that dysfunctional cognitive processing styles may be primed by early life experiences. More specifically, individuals develop a number of general basic schemas or frameworks during childhood and continue to elaborate on those schemas throughout life. Genetic predisposition or early maladaptive schemas could potentially influence the interpretation of an emotionally charged and physically harmful event such as an MVA. For that reason, this study assessed the basic schemas for mistrust and vulnerability described by Young (1994, 1999). Those particular schemas were chosen because they seemed highly relevant to the experience and aftermath of an MVA.

The initial findings on the SQ seemed to support the argument that certain individuals were predisposed or primed to develop maladaptive cognitive processes. MVA survivors who developed PTSD also subscribed to significantly higher levels of early maladaptive schemas related to mistrust and vulnerability. The control group of injured workers, many of whom met the classification for PTSD or PTSS, were not significantly different from the MVA PTSD group. Thus, the MVA PTSD group and the IW group initially appeared to have been primed early in life to process and interpret stimuli in a maladaptive and dysfunctional manner.

However, the findings on early maladaptive mistrust and vulnerability schemas, as measured by the SQ, were non-significant after adjustment for pain and depression. Previous research has suggested that the vulnerability subscale is associated with anxiety and the mistrust subscale is

associated with depression (Schmidt et al., 1995). In this study, basic vulnerability and mistrust appeared to be associated with pain and depression but not with PTSD status.

The results of this study suggest that schemas specifically related to road traffic situations developed later in life, perhaps as a response to the traumatic event, its sequelae, or both (J. Young, personal communication, September 23, 1999). Most of the participants in this study reported that they were employed and functioning well prior to the experience of the traumatic event. Admittedly, these were subjective reports. However, they are consistent with this study's findings that suggest that the maladaptive cognitive processing found in MVA survivors who developed PTSD was associated with the experience of the traumatic MVA and its sequelae.

Fourth, based on previous investigations and on this study's conceptualization of PTSD in MVA survivors, it was expected that higher ratings of perceived beneficial social interactions would be associated with more effective challenging and revising of maladaptive schemas germane to road traffic situations by MVA survivors as evidenced by lower scores on the MVRs. The findings supported Hypothesis 4. As the levels of perceived beneficial social interactions increased, the levels of maladaptive schemas specific to vulnerability in road traffic situations dropped. Causality cannot be determined on the basis of this correlational data.

Fifth, based on the implicit assumptions of Blanchard and Hickling (1997), it was expected that MVA survivors with PTSD, compared to MVA survivors without PTSD, would be uniquely characterized by significantly lower levels of perceived beneficial social interactions experienced within the previous 3 months. The findings suggest an association between higher levels of perceived beneficial interactions and lower levels of PTSD in MVA survivors. The assessment of perceived beneficial interactions which was used in this study specifically targeted raters' perceptions of their social networks regarding the encouragement or tolerance of expressions of thoughts and feelings and the provision of relevant and practical assistance. Sullivan et al. (1998) have noted the advantages of disclosure in reducing distress and promoting adaptive coping. Although previous investigations suggest that MVA survivors who develop PTSD may avoid talking about their experiences (Epstein, 1993; M. M. Green et al., 1993) factors associated with disclosure need to be elucidated. For example, a number of factors such as pain, disability, role changes within the family, and changes in employment status (e.g., unemployment, change in

work role or workplace), potentially impact on: (a) the number and the quality of social interactions that distressed individuals may experience: and (b) the opportunities and willingness to talk about traumatic experiences.

Sixth, based on previous investigations of MVA survivors with PTSD and of cognitive processing associated with pain and depression, it was expected that any differences on beneficial social interactions between MVA survivors with PTSD and MVA survivors without PTSD would no longer be significant after adjustment for pain and depression. Supporting this hypothesis, after accounting for the effects of pain and depression, group differences on perceived beneficial social interactions were non-significant. This finding appears to contradict previous research (Davidson et al., 1991; M. A. Green & Berlin, 1987; Joseph, Andrews, & Yule, 1992) that reported lower levels of beneficial social interactions in those with PTSD. However, social interactional influence may be a multidimensional factor encompassing: (a) perception and measurability of quality and quantity (Blanchard et al., 1997; Billings & Moos, 1984; Romans et al., 1992), (b) active solicitation (Z. Solomon et al, 1998), and (c) costs such as the expectation or obligation to provide or reciprocate beneficial social interactions (Lyons et al., 1998). In this investigation, beneficial social interactions appeared to be more related to global distress than to PTSD status. Future research needs to consider that the perception of beneficial social interactions may be multiply-determined in MVA survivors who develop PTSD.

General Discussion

Earlier work conceptualized schemas in depression (Beck, 1976), anxiety (Beck et al., 1985), and personality disorders (Young, 1994, 1999). Cognitive-behavioral treatment protocols based on these hypothetical mental constructs have been widely used with MVA survivors who develop PTSD (Blanchard & Hickling, 1997; Koch & Taylor, 1995). Previous investigations of MVA survivors with PTSD have suggested that cognitive processes may play an important role in PTSD (Bryant & Harvey, 1995; Harvey & Bryant, 1998a). Cognitive-behavioral clinical protocols for MVA survivors with PTSD target, challenge, and attempt to change this type of cognitive processing (Blanchard & Hickling, 1997; Koch & Taylor, 1995). Beneficial social interactions may be of critical importance in determining cognitive processes associated with PTSD and in determining the course of PTSD because they potentially provide opportunities for: (a) receiving encouragement and caring from others, (b) involvement and reconnection with others, (c) exchange of information, and (d) challenging and reinterpreting cognitions. Clinical protocols such as the one developed by Blanchard and Hickling (1997) may be particularly relevant because they not only promote but actually incorporate these aspects of beneficial social interactions. No previous investigations have attempted to tap into the content of a schema relevant to road traffic situations or to explore the association between beneficial social interactions and cognitive processes related to PTSD in MVA survivors. The present studies attempted to tap the content of a hypothetical schema specific to road traffic situations. The second study investigated social-cognitive processes in two groups of MVA survivors (i.e., with PTSD and without PTSD) as well as two control groups (injured workers and a community sample).

The findings of these investigations demonstrate that the content of a motor vehicle-related schema, as reflected by the ratings of potentially dysfunctional rules and assumptions specific to road traffic situations can be reliably and validly assessed. These investigations were an important step in that process. MVA survivors who developed PTSD appeared to subscribe to a more maladaptive framework for appraising and interpreting vulnerability to road traffic situations. The schema for evaluating this specific vulnerability appears to be distinct from schemas germane to the appraisal of general personal and interpersonal vulnerability not related to motor vehicle situations. Further, the results suggest that significant group differences found on the MVRS

questionnaire are robust even when adjusted for general vulnerability schemas, pain, and depression. This is in contrast to the group differences on general vulnerability schemas and beneficial social interactions that became non-significant after adjustment for pain and depression. Although causality cannot be inferred from this quasi-experimental design, the findings do suggest that a dysfunctional and maladaptive schema specific to road traffic situations is associated with PTSD in MVA survivors. Also, the MVRS questionnaire was most highly and negatively correlated with the measure of beneficial social interactions in the MVA groups. These findings raise issues for the prevention and treatment of PTSD in MVA survivors. First, the results support the therapeutic targets in the treatment protocol developed by Blanchard and Hickling (1997). Second, future research might focus on changes over time as well as on influencing factors on maladaptive cognitions specific to road traffic situations.

The differences in cognitive style regarding road traffic situations cannot be accounted for by differences on a number of variables including: age, sex, race, language, education, marital status, number of children, family history of psychiatric illness and physical disabilities, or personal history of significant loss. No significant differences were found between the MVA PTSD group and the MVA non-PTSD group regarding severity of injury, or the number of injured occupants in the MVA survivors' vehicles. Most of the MVA survivors had been the sole occupant of the vehicle at the time of the accident. Only two MVA survivors considered themselves to be responsible for the MVA and only one MVA involved fatalities.

MVA survivors who developed PTSD fared worse than MVA survivors who did not develop PTSD on a number of variables pertaining to employment following traumatic MVA. Whereas no significant differences were found on pre-accident employment, post-MVA, 70% of the MVA survivors with PTSD, compared to 5% of MVA survivors without PTSD were unemployed. Even though work dysfunction is a criterion for PTSD, we know little about the implications or contributions of work roles in distress and cognitive processing in PTSD. However, work dysfunction does appear to be associated with catastrophizing, pain, disability, depression, and pain-related intrusive cognitions (Sullivan et al., 1998). Nothing is known about how these factors may influence the development or the outcome of PTSD. Similarly, research has not addressed the possible influence of work roles on attention to pain, pain-related intrusive

cognitions, and trauma-related intrusive cognitions. These questions were beyond the scope of this investigation but could provide a focus for future research.

The MVA PTSD group also reported significantly higher levels of subjective pain and perceived disability than did either the MVA non-PTSD group or the CS group, and significantly higher levels of self-rated depression than did all other groups in Study 2. The findings suggest that these factors play a role in the evaluation and interpretation of general vulnerability and in the perception or need for beneficial social interactions in MVA survivors who develop PTSD. Findings on the BDI-II subscales have not previously been reported for individuals diagnosed with PTSD. However, the significant differences found for the MVA PTSD group are consistent with those of the other measures.

The results of this investigation also demonstrate that, in many respects (e.g., pain, disability, depression, employment) the injured workers were similar to MVA survivors who developed PTSD. As expected, more than half of the injured workers who participated in this study met classification for PTSS or PTSD. These findings, consistent with those of Asmundson et al. (1998), indicate that injured workers may well be traumatized and that this group warrants more attention in terms of prevention, recognition, treatment, and research.

Yet, despite the posttraumatic symptomatology and other similarities found in the IW group, the findings regarding the content of a dysfunctional schema specific to road traffic situations suggest that aspects of the cognitive experience of injured workers is distinct from that experienced by MVA survivors who develop PTSD. However, the characteristics shared by the MVA PTSD group and the IW group do raise questions regarding a schema specific to work injuries. It is possible that injured workers develop new rules, beliefs, or assumptions regarding the use of certain tools or equipment and other safety issues specific to traumatic work injuries. This exploration was beyond the scope of this study but could be a point of interest for future research.

These investigations developed an instrument that has demonstrated good face validity, high internal consistency and stability over 3 weeks. The measure discriminated between MVA survivors who developed PTSD and other participants in the study. The MVRs questionnaire correlated with a number of other instruments that measured general vulnerability schemas, pain,

disability, and depression, but remained robust when adjusted for those variables. In addition, the MVRS questionnaire correlated with a measure of beneficial social interactions. However, testing with a larger sample is required to determine the components of the scale. Further, although the findings suggest that the MVRS is distinct from other general vulnerability schemas, only two of the subscales on Young's Schema Questionnaire (Young & Brown, as reproduced in Young, 1994) were used in this investigation. It may be useful to compare a larger sample on the total Schema Questionnaire and the MVRS questionnaire.

Finally, the MVRS questionnaire does not represent the DSM-IV (APA, 1994a) criteria for PTSD. Therefore, after further validation and factor analysis, the MVRS may prove useful in identifying the few MVA survivors who may exaggerate the consequences of the MVA or malingering following an MVA. Thus it may be useful to administer the MVRS questionnaire to a participants who are advised to respond to items in keeping with how they think MVA survivors who develop PTSD might respond to the statements.

These investigations provided some insight into the content of a hypothetical framework for appraising and interpreting situations specific to road traffic situations. The findings suggest that the cognitive processes of MVA survivors who develop PTSD subsequent to traumatic MVA may be distinct from those of others and may be associated with PTSD. Further, perceived beneficial social interactions in MVA survivors appears to be associated with maladaptive and dysfunctional cognitive processes in MVA survivors who develop PTSD. There are a number of questions for future research. A larger sample is needed to further validate and determine the factor structure of the MVRS questionnaire. It would be useful to determine if schema content assessed on the MVRS questionnaire changes over time or changes in response to treatment. An exploration of the factors (e.g., treatment, driving exposure, medications) underlying or associated with schema specific to road traffic situations would further our understanding of cognitive processes in MVA survivors who develop PTSD. Finally, some genetic or environmental factors may predispose MVA survivors who develop PTSD to organize and interpret their experiences in ways that differ from those of MVA survivors who do not develop PTSD. Future research could elucidate on these contributing factors.

In summary, the findings from the present investigations underscore the importance of cognitive processes in MVA survivors who develop PTSD and demonstrate that content of a schema specific to road traffic situations can be accessed. Maladaptive and dysfunctional cognitions related to road traffic situations are robust, even after adjustment for a number of potential contributing factors. The perception of beneficial social interactions appears to be associated with distress associated with pain and depression but not with PTSD per se. The implications of these findings for future research have been discussed.

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APPENDIX A

RECRUITMENT SCRIPT FOR UNIVERSITY OF OTTAWA STUDENTS

My name is Lynn Miller. I am doing research concerning experiences related to motor vehicles. I am a doctoral student in the Clinical Psychology Program at the University of Ottawa. My supervisor is Dr. Ken Reesor. The purpose of the study is to better understand thoughts, feelings, and behaviors related to motor vehicles such as cars, trucks, motorcycles, snowmobiles, and/or buses. We would like to know if you are interested in participating in this research project.

If you decide to participate in this research project, you will be asked to complete a questionnaire today and again in 3 weeks. Completion of the questionnaire will take about 10 minutes of your time. This questionnaire concerns thoughts, feelings, and behaviors related to motor vehicles. Completed questionnaires will be stored in safe place and will be accessible to the researchers only. All responses will be coded to ensure confidentiality and will be used for research purposes only. No personal information will be disclosed. Your professor will not be aware of your participation status and will not have access to your individual responses. Confidentiality is assured.

Your participation in this research project is strictly voluntary. You will receive no compensation for your participation and you will not be penalized if you decide not to participate. Your professor will not be informed concerning those who decide to participate or those who opt not to participate. You will not be asked to sign a consent form. If you complete the questionnaire, it will be understood that you have consented to participate. You may withdraw at any time. If you decide to withdraw, simply do not complete the remainder of the questionnaire. You may refuse to answer any particular question.

If you agree to participate, please complete the questionnaire that I will pass out to everyone in the classroom. Whether or not you have completed the questionnaire, please return it to me. If you decide not to participate, simply leave the questionnaire blank and return it in the same manner as those who participate. If you participate, you will be able to receive a summary of the results of this part of the study in about 2 months if you provide me with your phone number.

Whether you participate or not, I would like to thank all of you for your time.

Note: This script will be read on both visits to the class. On the second visit to the class, the words "and again in 3 weeks" will be omitted when the recruitment script is read to the students.

APPENDIX B

Motor Vehicle-Related Schemas

INSTRUCTIONS

The following statements are things that people might think or feel, especially after they have been involved in a motor vehicle accident. Read each statement carefully. Then choose the *highest rating from 1 to 6* that best describes your level of agreement with those thoughts or feelings and write the number in the space before the statement.

RATING SCALE

1 = totally disagree

2 = usually disagree

3 = agree more often than not

4 = sometimes agree

5 = usually agree

6 = always agree

EXAMPLE: 4 Most people would be willing to drive a blue car.

1. Others don't pay attention to the road when they drive.
2. I often have to watch out for other drivers.
3. Others don't care if they get into an accident.
4. I can trust almost anyone to drive me.
5. Other drivers do dangerous things while driving (use cell phone, eat...)
6. I worry about people who drive when they take certain types of medications (e.g., pain killers, antidepressants, muscle relaxants).
7. I don't know how most people got their drivers' licences.
8. I don't trust others to drive my family members.
9. Some people should not be allowed to drive.
10. When family members travel to other cities, I worry that they will be involved in a motor vehicle accident.

RATING SCALE**1 = totally disagree****2 = usually disagree****3 = agree more often than not****4 = sometimes agree****5 = usually agree****6 = always agree**

11. ____ Most people know how to drive in bad weather.
12. ____ On some roads, drivers think that they can drive as fast or as close (to other motor vehicles) as they want.
13. ____ Others don't listen when I tell them that I'm afraid when I'm in a motor vehicle.
14. ____ Others don't understand what I'm going through.
15. ____ Most drivers usually obey traffic laws (speed, stops, giving right of way...).
16. ____ Some roads (highways, local roads...) are very dangerous.
17. ____ I worry about the safety of family members when they are passengers in others' (e.g., friends, acquaintances, taxi/bus drivers...) motor vehicles.
18. ____ A lot of drivers take their anger out on the road.
19. ____ I have to keep the driver aware of potential dangers (slowing traffic, merging traffic, lights changing color, spacing between vehicles...) on the road.
20. ____ The law doesn't seem to take bad or dangerous drivers seriously.
21. ____ I don't worry about the safety of other family members when they are driving a motor vehicle.
22. ____ People are considerate of others when they drive.
23. ____ I worry that certain mental or physical problems may affect the abilities of other drivers.

APPENDIX C

MOTOR VEHICLE ACCIDENT RESEARCH PROJECT: DESCRIPTION (FORM A)

Motor vehicle accidents are common events, yet we know little about the experiences of those involved in such accidents. To increase our understanding of the experiences of those involved in motor vehicle accidents while a driver, passenger, pedestrian, or bicyclist, we would like to interview people who **have been involved** in an accident involving a car, truck, motorcycle, snowmobile, or bus. The interview and completion of questionnaires will take approximately 1 ½ to 2 hours and consist of a history of the accident and questions about your experiences during and following the accident, including the accident's impact on your physical well-being, thoughts and emotional state.

Some people who have experienced a motor vehicle accident may be involved with insurance and/or compensation claims. For that reason, names of participants in the study will not appear on any questionnaires. All responses will be coded to ensure confidentiality and will be used only for research purposes.

If you are interested in participating in this project or would like more information, please write your name and phone number in the space below and leave this sheet with your physician or therapist or call Lynn Miller at 230-0250. We will contact you to discuss the project and, if you agree, arrange an interview time. Thank you for your time.

Lynn Miller, Dr. Ken Reesor
University of Ottawa
Phone: 230-0250 Ext.:405

Yes, I am interested in being contacted concerning this project.

NAME (please print): _____

PHONE: _____ MOST CONVENIENT TIME FOR CALL: _____

MOTOR VEHICLE ACCIDENT RESEARCH PROJECT: DESCRIPTION (FORM B)

Motor vehicle accidents are common events, yet we know little about the experiences of those involved in such accidents. To increase our understanding of the experiences of those involved in motor vehicle accidents while a driver, passenger, pedestrian, or bicyclist, we would like to interview people who **have not been involved** in an accident involving a car, truck, motorcycle, snowmobile, or bus during the **past five years** but who have been involved in a work-related accident not involving the use or operation of a motor vehicle. The interview and completion of questionnaires will take approximately 1 ½ to 2 hours and consist of a history of the accident and questions about your experiences during and following the accident, including the accident's impact on your physical well-being, thoughts and emotional state.

Some people who have experienced a work-related accident may be involved with insurance and/or compensation claims. For that reason, names of participants in the study will not appear on any questionnaires. All responses will be coded to ensure confidentiality and will be used only for research purposes.

If you are interested in participating in this project or would like more information, please write your name and phone number in the space below and leave this sheet with your physician or therapist or call Lynn Miller at 230-0250. We will contact you to discuss the project and, if you agree, arrange an interview time. Thank you for your time.

Lynn Miller, Dr. Ken Reesor
University of Ottawa
230-0250

Yes, I am interested in being contacted concerning this project.

NAME (please print): _____

PHONE: _____ MOST CONVENIENT TIME FOR CALL: _____

MOTOR VEHICLE ACCIDENT RESEARCH PROJECT: DESCRIPTION (FORM C)

Motor vehicle accidents are common events, yet we know little about the experiences of those involved in such accidents. To increase our understanding of the experiences of those involved in motor vehicle accidents while a driver, passenger, pedestrian, or bicyclist, we would like to interview people who have and have not been involved in an accident involving a car, truck, motorcycle, snowmobile, or bus. The completion of questionnaires will take approximately 1 ½ to 2 hours and consist of a history of the accident and questions about your experiences during and following the accident or (other significant event which may have occurred in the past 2 years), including the accident's (or other event's) impact on your physical well-being, thoughts and emotional state.

Some people who have experienced a motor vehicle accident (or other significant event) may be involved with insurance and/or compensation claims. For that reason, names of participants in the study will not appear on any questionnaires. All responses will be coded to ensure confidentiality and will be used only for research purposes.

If you are interested in participating in this project or would like more information, please write your name and phone number in the space below or phone Lynn Miller at 230-0250. We will contact you to discuss the project and, if you agree, arrange an interview time. Thank you for your time.

Lynn Miller, Dr. Ken Reesor
University of Ottawa
230-0250

Yes. I am interested in being contacted concerning this project.

NAME (please print): _____

PHONE: _____ MOST CONVENIENT TIME FOR CALL: _____

APPENDIX D

MOTOR VEHICLE ACCIDENT RESEARCH PROJECT: INFORMATION SHEET

My name is Lynn Miller. I am a doctoral student in the Clinical Psychology program at the University of Ottawa. I am being supervised by Dr. Ken Reesor, an adjunct professor at the School of Psychology of the University of Ottawa. As researchers in this project, we are interested in learning more about people's thoughts, feelings, and behaviors related to the use of motor vehicles, and things which may affect those thoughts, feelings, and behaviors. We believe that this information will be helpful in furthering an understanding of people's experiences following a motor vehicle accident.

If you agree to participate in this project, you will be asked to sign two copies of a consent form (you will keep one copy of the consent form as well as a copy of this information sheet). You will be asked to meet with the researcher and answer some questions concerning your accident (or other significant event) which has occurred within the past 3-24 months and its impact on your activities, thoughts, emotional and physical state. You will also be asked to complete some pencil-and-paper questionnaires concerning your assessment of your physical and emotional well-being, your thoughts, feelings and behaviors related to the use of motor vehicles. All together, this will involve about 1 ½ to 2 hours of your time.

All the information you provide will be kept confidential and used for research only. Your responses will be recorded on coded sheets. Your name and any other identifying information will not appear on any questionnaires. The questionnaires will use an identification code. The master list which will contain both your name and your identification code will be kept locked in the research supervisor's office and will not be disclosed. This information will be known to the researchers strictly for the purposes of the research. Your responses will be grouped together with responses from other participants for statistical analysis. In reporting the results of this research, individual responses will not be reported in any way without your specific written consent. If you would like your health care provider to receive a copy of your individual results, your written request will be required.

This research will deal with personal information which may be somewhat upsetting for some participants. Every effort will be made to minimize any discomfort you may experience. A list of resources will be provided in case you report feeling distressed at the time of the interview

or decide that you would like to consult someone at a later time.

We would appreciate your help and cooperation but you are under no obligation to take part in this project. You may also choose to withdraw from the project at any point without question and without affecting in any way the services you are presently receiving or may require in the future. You may also refuse to answer any particular question(s) which make you uncomfortable.

Thank you for your time. We would be pleased to answer any questions or concerns you have concerning this research.

Lynn Miller and Dr. Ken Reesor

University of Ottawa

Phone: 230-0250 Ext.: 405

APPENDIX E

MOTOR VEHICLE ACCIDENT RESEARCH PROJECT: CONSENT FORM

Lynn Miller

University of Ottawa

Ottawa, ON

K1N 6N5

Phone: 230-0250 Ext.: 405

I, _____, have read the attached information sheet and discussed any questions or concerns I have with the researchers.

I give my informed voluntary consent to participate.

SIGNATURE: _____

DATE: _____

WITNESS: _____

A summary of the results of this research project will be mailed to you when the research project has been completed if you provide your mailing address in the space below:

APPENDIX F

LIST OF RESOURCES

ALCOHOL ASSESSMENT (Bilingual) 238-8230

Addiction Research Foundation
City Centre
880 Wellington St, Suite 800
Ottawa, ON
K1R 6K7

BEREAVEMENT 738-7171

Bereaved Families of Ottawa-Carleton
2435 Holly Lane
Administration- 738-3083

PSYCHOTHERAPY 562-5289

Centre for Psychological Services
University of Ottawa
11 Marie Curie Private
6th Floor
Ottawa, ON
K1N 6N5

PSYCHOLOGICAL ASSOCIATION 1-416-961-0069 1-800-268-0069

Ontario Psychological Association Referral Service
730 Yonge St
Toronto, ON

HOSPITALS

Ottawa Civic Hospital	Emergency	761-4621
Ottawa General Hospital	Emergency	737-8000
Royal Ottawa Hospital	Emergency	722-6521- ext 6247

COUNSELING 233-8478

Catholic Family Service of Ottawa-Carleton
200 Isabella St.
4th Floor
Ottawa, ON
K1S 1V7

individual, couple, family counseling

COUNSELING

725-3601

Family Service Centre of Ottawa-Carleton
119 Ross Ave
Ottawa, ON
K1Y 0N6

couple, individual, family, abuse/violence counseling

COUNSELING

235-0000

Jewish Family Service of Ottawa-Carleton
151 Chapel St
Ottawa, ON
K1N 7Y2

individual and group counseling

COUNSELING (gay/lesbian)

563-4818

Pink Triangle Services
PO Box 3043 Stn D
Ottawa, ON
K1P 6H6

Gayline (evenings) 238-1717
counseling, education, advocacy

CRISIS

24 hr line- 238-3311

Distress Centre of Ottawa and Region
P.O. Box 2671 Stn D
Ottawa, ON
K1P 5W7

Youthline (1600-2300 hrs.)- 238-2088
Drug (24 hr line)- 1-800-567-DRUG

INFORMATION/RESOURCES

830-4357

Cumberland Township Community Resource Centre
210 Centrum Blvd, Suite 211
Orleans, ON

individual, couple & family counseling; multicultural services; support groups, information, referrals, emergency food and clothing, advisory committee for disabled

APPENDIX G

MOTOR VEHICLE ACCIDENT QUESTIONNAIRE**AGE** _____ **SEX** male _____ female _____**RESIDENCY**

Place of birth: _____

Number of years you have lived in Canada _____

Number of years you have lived in another country or countries _____

Name other country (countries) where you have previously lived _____

LANGUAGES (*check all those which apply*)

English _____ French _____ Other(s) _____

MARITAL STATUS (*check one*)

Single _____

Common-law _____

Divorced _____

Married _____

Separated _____

CHILDREN

Number of children _____

EDUCATION (*circle last grade completed*)

Grade: 1 2 3 4 5 6 7 8 9 10 11 12 13

College/University: Diploma/degree _____

or years completed _____

Post-graduate/Professional: Degree _____

or years completed _____

OCCUPATION

Present occupation: _____

Have you changed occupation as a result of a motor vehicle accident(s)?

No ____ Yes ____ Year ____

If yes, previous occupation _____

PAST EVENTS (*check all those which apply*)

Have you experienced any of the following:

- ☐ death of one or both parents
☐ death of one or more of your children
☐ death of your spouse/partner
☐ death of some other significant person in your life
☐ separation/divorce of your parents
☐ separation from your parents/family during your childhood (because of illness, foster care, ...)
☐ serious illness/disability of one or more of your family members
☐ separation/divorce from your spouse/partner
☐ serious illness/disability (self)
☐ any other loss of significance to you (i.e., job, pet, property...)

FAMILY HISTORY (*check all those which apply*)The following concerns your family- parents, brother/sisters, spouse/partner, children. Have any of your *family members* ever been treated for any of the following?

depression	No ☐	Yes ☐	Length of treatment ☐
alcohol or drug abuse	No ☐	Yes ☐	Length of treatment ☐
physical disability ☐	No ☐	Yes ☐	Length of treatment ☐
panic attacks ☐	No ☐	Yes ☐	Length of treatment ☐
anxiety ☐	No ☐	Yes ☐	Length of treatment ☐
fear of specific things or situations (spiders, elevators...)	No ☐	Yes ☐	Length of treatment ☐

PERSONAL HISTORY**ACCIDENT HISTORY**

Number of motor vehicle accidents involved in as a passenger, driver, or bystander:

☐ during your lifetime (including the past 2 years)

Please complete the following questions concerning *your most personally significant accident*.

Number of vehicles involved: _____

Number of people in your vehicle: _____

Your position at the time of the accident:

driver _____

passenger _____

pedestrian _____

other (explain) _____

(a) Were *you* injured?

no injuries _____ minor injuries _____ major injuries _____

Did you develop chronic pain as a result of the accident? _____

(b) Were *others* injured? No _____ Yes _____

Number of others injured _____

Relationship _____

(c) Who or what do *you* think was responsible for the accident? _____

(d) Who or what do the *police* think was responsible for the accident? _____

PSYCHOLOGICAL HISTORY

Have you ever experienced any of the following?

_____ Depression _____ Fear of specific things or situations(spiders, elevators...)

_____ Panic attacks _____ Anxiety

Have you ever seen a family physician, counselor, psychologist, or psychiatrist for any of the above?

No _____ Yes _____ Year _____ Length of treatment _____

Please list all of the medications which you now take (include those medication which you take occasionally and those which you take regularly).

TYPE OF INJURY (check all those which apply)

Fracture(s) _____ Soft tissue _____ Head injury _____ Scar(s) _____

Other (please describe) _____

Did you lose consciousness? Yes _____ How long? _____ No _____

Did you have any memory loss? Yes _____ How long? _____ No _____

PERSONAL INJURY

Please check all bodily areas injured in this accident.

Head _____ Arms/hands _____ Face _____ Legs/feet _____ Neck _____

Back _____ Internal injuries (please describe) _____

Clinician-Administered PTSD Scale (CAPS)

Sample CAPS Question

3. (B-3) Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). Note: In young children, trauma-specific reenactment may occur.

Frequency

Have you ever suddenly acted or felt as if (EVENT) were happening again? (Have you ever had flashbacks about [EVENT]?) [IF NOT CLEAR:] (Did this ever occur while you were awake, or only in dreams?) [EXCLUDE IF OCCURRED ONLY DURING DREAMS] Tell me more about that. How often has that happened in the past month (week)?

- * 0 Never
- * 1 Once or twice
- * 2 Once or twice a week
- * 3 Several times a week
- * 4 Daily or almost every day

Description/Examples

Intensity

How much did it seem as if (EVENT) were happening again? (Were you confused about where you actually were or what you were doing at the time?) How long did it last? What did you do while this was happening? (Did other people notice your behavior? What did they say?)

- * 0 No reliving
- * 1 Mild, somewhat more realistic than just thinking about event
- * 2 Moderate, definite but transient dissociative quality, still very aware of surroundings, daydreaming quality
- * 3 Severe, strongly dissociative (reports images, sounds, or smells) but retained some awareness of surroundings
- * 4 Extreme, complete dissociation (flashback), no awareness of surroundings, may be unresponsive, possible amnesia for the episode (blackout)

QV (specify) _____

Past week

* F _____
* I _____

Past month

* F _____
* I _____
* Sx: Y N

Lifetime

* F _____
* I _____
* Sx: Y N

From "Clinician-Administered PTSD Scale (CAPS)," by D. D. Blake, F. W. Weathers, L. M. Nagy, D. G. Kaloupek, D. S. Charney, and T. M. Keane, 1998. [Electronic data file] National Center For PTSD, Research and Education on Post-Traumatic Stress Disorder, distributed through the internet at <http://www.dartmouth.edu/dms/ptsd/CAPS.html>. All information contained on these pages is in the public domain unless explicit notice is given to the contrary, and may be copied and distributed without restriction. This page was last updated on 29 April 1999. For more information telephone at (802) 296-5132 or send email to ptsd@dartmouth.edu

Revised Impact of Event Scale

On _____ you experienced _____
(date) (life event)

Below is a list of comments made by people after stressful life events. Please check each item, indicating- how frequently these comments were true for you DURING THE PAST SEVEN DAYS. If they did not occur during that time, please mark the "not at all" column.

		<u>FREQUENCY</u>			
		<u>Not at All</u>	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>
1.	I thought about it when I didn't mean to.				
2.	I avoided letting myself get upset when I thought about it or was reminded of it.				
3.	I tried to remove it from memory.				
4.	I had trouble falling asleep or staying asleep, because of pictures or thoughts about it that came into my mind.				
5.	I had waves of strong feelings about it.				
6.	I had dreams about it.				
7.	I stayed away from reminders of it.				
8.	I felt as if it hadn't happened or it wasn't real.				
9.	I tried not to talk about it.				
10.	Pictures about it popped into my mind.				
11.	Other things kept making me think about it.				
12.	I was aware that I still had a lot of feelings about it, but I didn't deal with them.				
13.	I tried not to think about it.				
14.	Any reminder brought back feelings about it.				
15.	My feelings about it were kind of numb.				

From "Impact of Event Scale: A measure of subjective stress," by M. J. Horowitz, N. Wilner, and W. Alvarez, 1979, *Psychosomatic Medicine*, **41**, p. 214. Copyright 1979 by Lippincott, Williams, and Wilkins. Reprinted with permission.

Accident Fear Questionnaire

The following questions are about your motor vehicle accident and your reactions to it. This questionnaire only applies to you, if you remember the accident.

	YES	NO
1. During the accident did you fear for your life?.....	_____	_____
2. During the accident did you see anyone injured or killed?.....	_____	_____
3. During the accident did you lose consciousness.....	_____	_____
4. Do you have nightmares about the accident?.....	_____	_____
5. Are you nervous before trips?.....	_____	_____
6. Do you easily get upset in the car?.....	_____	_____
7. Do you tell the driver what to do?.....	_____	_____
9. Do you drive less than you used to?.....	_____	_____
9. Do you expect another accident soon?.....	_____	_____
10. Would most people feel after an accident the way you do?.....	_____	_____

Instructions: How much do you avoid the situations listed below because of fear or distress? For each question, please pick a number from the scale below to show much you avoid the situation. Then write the number on the line opposite the situation.

0	1	2	3	4	5	6	7	8
Would not		Sometimes				Often		Always
Avoid it		avoid it				avoid it		avoid it

Since your accident, do you avoid:

11. Driving as a passenger..... _____
12. Driving yourself..... _____
13. Riding in a particular seat..... _____
14. Driving on certain roads..... _____
15. Riding with certain drivers..... _____
16. Driving in certain weather conditions..... _____
17. Hearing news of accidents..... _____
18. Seeing wounds and injuries..... _____
19. Crossing streets alone..... _____
20. Riding a bus or streetcar _____

From "A brief self-rating scale for PTSD after road vehicle accident," by K. Kuch, B. J. Cox, and D. M. Dorenfeld, 1995, *Journal of Anxiety Disorders*, 9, pp. 513-514. Copyright 1995 by Elsevier Science. Reprinted with permission.

SHORT-FORM MCGILL PAIN QUESTIONNAIRE

PATIENTS NAME: : _____

DATE: _____

	<u>NONE</u>	<u>MILD</u>	<u>MODERATE</u>	<u>SEVERE</u>
THROBBING	0)_____	1)_____	2)_____	3)_____
SHOOTING	0)_____	1)_____	2)_____	3)_____
STABBING	0)_____	1)_____	2)_____	3)_____
SHARP	0)_____	1)_____	2)_____	3)_____
CRAMPING	0)_____	1)_____	2)_____	3)_____
GNAWING	0)_____	1)_____	2)_____	3)_____
HOT-BURNING	0)_____	1)_____	2)_____	3)_____
ACHING	0)_____	1)_____	2)_____	3)_____
HEAVY	0)_____	1)_____	2)_____	3)_____
TENDER	0)_____	1)_____	2)_____	3)_____
SPLITTING	0)_____	1)_____	2)_____	3)_____
TIRING-EXHAUSTING	0)_____	1)_____	2)_____	3)_____
SICKENING	0)_____	1)_____	2)_____	3)_____
FEARFUL	0)_____	1)_____	2)_____	3)_____
PUNISHING-CRUEL	0)_____	1)_____	2)_____	3)_____

From "The short-form McGill Pain Questionnaire," by R. Melzack, 1987, *Pain*, **30**, p. 193.

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Pain Disability Index

The rating scales below are designed to measure the degree to which several aspects of your life are presently disrupted by chronic pain. In other words, we would like to know how much your pain is preventing you from doing what you would normally do, or from doing it as well as you normally would. Respond to each category by indicating the overall impact of pain in your life, not just when the pain is at its worst.

For each of the 7 categories of life activity listed, please circle the number on the scale which describes the level of disability you typically experience. A score of 0 means no disability at all, and a score of 10 signifies that all of the activities in which you would normally be involved have been totally disrupted or prevented by your pain.

(1) Family/home responsibilities

This category refers to activities related to the home or family. It includes chores or duties performed around the house (e.g., yard work) and errands or favors for other family members (e.g., driving the children to school).

0	1	2	3	4	5	6	7	9	10
no								total	
disability								disability	

(2) Recreation

This category includes hobbies, sports, and other similar leisure time activities.

0	1	2	3	4	5	6	7	9	10
no								total	
disability								disability	

(3) Social activity

This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social functions.

0	1	2	3	4	5	6	7	9	10
no									total
disability									disability

(4) Occupation

This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

0	1	2	3	4	5	6	7	9	10
no									total
disability									disability

(5) Sexual behavior

This category refers to the frequency and quality of one's sex life.

0	1	2	3	4	5	6	7	9	10
no									total
disability									disability

(6) Self-care

This category includes activities which involve personal maintenance and independent dally living (e.g., taking a shower, driving, getting dressed, etc.).

0	1	2	3	4	5	6	7	9	10
no								total	
disability								disability	

(7) Life-support activity

This category refers to basic life-supporting behaviors such as eating, sleeping, and breathing.

0	1	2	3	4	5	6	7	9	10
no								total	
disability								disability	

From "The Pain Disability Index: Psychometric properties" by R. C. Tait, J. T. Chibnall, and S. Krause, 1990, *Pain*, **40**, pp.180-181. Copyright 1990 by Elsevier Science. Reprinted with permission.

SCHEMA QUESTIONNAIRE (Second Edition)

Name _____ Date _____

INSTRUCTIONS

Listed below are statements that a person might use to describe himself or herself. Please read each statement and decide how well it describes you. When you are not sure, base your answer on what you emotionally **feel**, not on what you **think** to be true. Choose the **highest** rating from 1 to 6 that describes you and write the number in the space before the statement.

RATING SCALE

- 1 = Completely untrue of me
- 2 = Mostly untrue of me
- 3 = Slightly more true than untrue
- 4 = Moderately true of me
- 5 = Mostly true of me
- 6 = Describes me perfectly

EXAMPLE

I care about

A. 4 I worry that ^ will not like me.

- 28. _____ I feel that people will take advantage of me.
- 29. _____ I often feel that I have to protect myself from other people.
- 30. _____ I feel that I cannot let my guard down in the presence of other people, or else they will intentionally hurt me.
- 31. _____ If someone acts nicely towards me, I assume that he/she must be after something.
- 32. _____ It is only a matter of time before someone betrays me.
- 33. _____ Most people only think about themselves.

34. _____ I have a great deal of difficulty trusting people.
35. _____ I am quite suspicious of other people's motives.
36. _____ Other people are rarely honest; they are usually not what they appear.
37. _____ I'm usually on the lookout for people's ulterior motives.
38. _____ If I think someone is out to hurt me, I try to hurt them first.
39. _____ People usually have to prove themselves to me before I can trust them.
40. _____ I set up "tests" for other people to see if they are telling me the truth and are well-intentioned.
41. _____ I subscribe to the belief: "Control or be controlled."
42. _____ I get angry when I think about the ways I have been mistreated by other people throughout my life.
43. _____ Throughout my life, those close to me have taken advantage of me or used me for their own purposes.
44. _____ I have been physically, emotionally, or sexually abused by important people in my life.
*ma
103. _____ I can't seem to escape the feeling that something bad is about to happen.
104. _____ I feel that a disaster (natural, criminal, financial, or medical) could strike at any moment.
105. _____ I worry about becoming a street person or vagrant.
106. _____ I worry about being attacked.
107. _____ I feel that I must be very careful about money or else I might end up with nothing.
108. _____ I take great precautions to avoid getting sick or hurt.
109. _____ I worry that I'll lose all my money and become destitute.

110. _____ I worry that I'm developing a serious illness, even though nothing serious has been diagnosed by a physician.
111. _____ I am a fearful person.
112. _____ I worry a lot about the bad things happening in the world: crime, pollution, and so on.
113. _____ I often feel that I might go crazy.
114. _____ I often feel that I'm going to have an anxiety attack.
115. _____ I often worry that I might have a heart attack, even though there is little medical reason to be concerned.
116. _____ I feel that the world is a dangerous place.
- *vh

*ma - Mistrust/Abuse

*vh - Vulnerability to Harm and Illness

From "Schema Questionnaire (Second Edition)," by J. E. Young and G. Brown, 1990, as reproduced in *Cognitive therapy for personality disorders: A schema-focused approach* (Rev. ed.), pp. 65-66 and 70-71. Copyright 1990 Jeffrey Young, Ph.D., and Gary Brown, M.Ed. Unauthorized reproduction without written consent of the authors is prohibited. For more information, write: Cognitive Therapy Center of New York, 120 East 56th St., Suite 530, New York, NY 10022. Reprinted with permission.

Crisis Support Items

1. Whenever you wanted to talk, how often was there someone willing to listen just after the disaster?
2. Whenever you want to talk, how often is there someone willing to listen at the present time?
3. Did you have personal contact with other survivors, or people with a similar experience just after the disaster?
4. Do you have personal contact with other survivors or people with a similar experience at the present time?
5. Were you able to talk about your thoughts and feelings just after the disaster?
6. Are able to talk about your thoughts and feelings at the present time?
7. Were people sympathetic and supportive just after the disaster?
8. Are people sympathetic and supportive at the present time?
9. Were people helpful in a practical sort of way just after the disaster?
10. Are people helpful in a practical sort of way at the present time?
11. Did people you expected to be supportive make you feel worse at any time just after the disaster?
12. Do people you expect to be supportive make you feel worse at any time at the present time?
13. Overall, were you satisfied with the support you received just after the disaster?
14. Overall, are you satisfied with the support you are receiving at the present time?

From "Crisis support and psychiatric symptomatology in adult survivors of the Jupiter cruise ship disaster," by S. Joseph, B. Andrews, R. Williams, and W. Yule, 1992, *British Journal of Clinical Psychology*, 31, p. 73. Copyright 1992 by The British Psychological Society. Reprinted with permission.

Note. In this study, the word "disaster" was replaced by the word "accident".