PSYCHOLOGICAL SEQUELAE OF MINOR MOTOR VEHICLE ACCIDENTS: VULNERABILITY AND PROTECTIVE FACTORS

by

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A thesis submitted in conformity with the requirements for the Degree of Doctor of Education, Graduate Department of Adult Education, Community Development and Counselling Psychology, University of Toronto

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ABSTRACT

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This study examined the psychological sequelae of minor motor vehicle accidents (MVAs). One hundred adult volunteers were assessed for symptoms of depression, anxiety, intrusion and avoidance resulting from the minor MVA using standardized measures. It was hypothesized that a group of victims of minor MVAs would report severe psychological symptoms regardless the minor nature of their accidents and that the group with severe symptoms would differ from the group with minimal symptoms in the intervening variables. It was also predicted that the hostility received in the recovery environment would have a more significant relationship to psychological symptomatology than the support received.

Twenty five percent of the sample reported severe depression and 47% reported severe anxiety. Significant levels of post traumatic stress were reported by 65% of the participants involved in minor MVAs. Results indicate that the experience of the MVA as threatening to the victim’s life is a factor which increase vulnerability for higher psychological symptomatology after minor MVAs. Significant patterns of relationships among the different symptom severity groups and the pre-MVA, MVA and post-MVA variables were found using MANOVA. Individuals with a tendency to experience negative affects were found to be at risk to develop severe levels of anxiety and depression following a minor MVA but this vulnerability was not
found to have an effect on the severity of post-traumatic symptoms. Results suggest that the exposure to previous traumatic events do not predispose MVA victims to higher symptomatology after a minor MVA but that previous experiences of traumatic events in which there has been a death threat may have a vulnerability effect. This vulnerability effect may be related to reactivation of traumatic memories.

The incidence of severe symptomatology after a minor MVA was comparable to results of research involving severely injured MVA victims, suggesting that the severity of the injury in a MVA may not play an essential role in the development of psychological symptoms, instead, subjective factors such as fear for one's life and environmental factors such as hostility in the recovery environment, may play a more significant role in the severity of symptomatology. Hostility received in the recovery environment accounted for more of the psychological symptom variance of the MVA sample than the support received.

The findings of the current research point to the impact of negative relationships in the post-MVA environment and to the detrimental effects of a hostile family environment in the development of severe psychological symptoms. Social support was not found to be a protective factor for symptom severity. The lack of importance of support as a protective variable for psychological symptoms after minor MVAs in the context of the significant importance of hostility as a vulnerability factor is perhaps the most interesting finding of the present study.
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CHAPTER 1
INTRODUCTION

1.1 Motor Vehicle Accidents

Motor vehicle accidents (MVA), are a major killer and crippler in Canada, in the United States and in the rest of the world and are responsible for more deaths than homicides and suicides combined (Dlugokinski, 1985). In Canada, during 1991 approximately 6.4% of Ontario's vehicles and 5.8% of Ontario's drivers were involved in accidents. In total, there were 213,669 accidents involving 396,780 vehicles. Of all accidents, 59,242 resulted in at least one person being injured (Ontario Ministry of Transportation, 1992). World estimations indicate that each year 10 million people are involved in a MVAs and 230,000 people die on the road (Bull, 1979).

1.2 Sequelae of Motor Vehicle Accidents

Victims of motor vehicle accidents and their families often suffer physical and emotional distress and face dramatic life changes as result of accident related trauma (Goldberg & Gara, 1990; Lehman, Wortman & Williams, 1987). The MVA victim's life style may change suddenly and unexpectedly in many areas including work, finances, relationships, family and social activities; previous ways of experiencing enjoyment and life satisfaction may no longer be accessible to the victim and his or her family. Psychologically, the MVA victim may develop a variety of disabling symptoms including depression (Goldberg & Gara, 1990), phobias (Bryant & Harvey, 1995a; Kuch, 1989b), subsyndromal Post Traumatic Stress Disorder (PTSD) (Blanchard, Hickling, Taylor & Loos, 1995), and full-blown PTSD (Burstein, 1989). One study on the long-term consequences of road traffic injuries for both patients and their families indicate
that the psychiatric and psychosocial consequences of traffic accidents are a major cause of reduced mental health in our society (Malt, Hoivik & Blikra, 1993).

Despite the significant sequelae of motor vehicle accidents (MVA) on individuals, victims have received such limited attention from mental health professionals that at one point they were described as "The quiet victims" (Dlugokinsky, 1985). Dlugokinsky (1985) explains that victims of MVA usually seek only physical rehabilitation and that psychological support is brought in after severe psychological damage has occurred. These comments suggest that the psychological sequelae of injured MVA victims is regularly overlooked. The vast majority of MVAs are non-fatal collisions resulting in minor physical injuries. However, MVA victims seem to develop psychological symptoms regardless of the severity of the injury sustained (Bryant & Harvey, 1995a; Kuch, 1989a; Smith, 1989). Pilowsky (1985) explains that the emotional trauma associated with an apparently "trivial" accident may be overlooked because patients tend to suppress the more horrifying aspects of their accident experience and thus, they conceal the true nature of their experience from the health professionals. This may explain the lack of research on the psychological sequelae of "trivial" or minor MVAs.

The psychological effects of motor vehicle accidents, when considered as traumatic events capable of generating traumatic reactions, have also been neglected in the literature. Norris (1992) studied the frequency (how frequent a traumatic event occurs) and impact (how individuals are affected) of ten different types of traumatic events in the general population and reported that MVAs presented the most adverse combination in terms of frequency and impact. He noted that in spite of this adverse combination, MVAs have been studied significantly less than traumatic events such as crime, disaster and bereavement. Brom, Kleber & Hofman (1993)
concluded that traffic accidents are clear contributors to mental health problems and thus there is no justification for the present neglect of the psychological problems they create. Other authors have also noted the scarcity of systematic study in the literature of the psychological consequences of MVAs (Burstein, 1989; Goldberg & Gara, 1990; Kuch, 1989b; Smith, 1989).

Over the last few years there has been growing attention paid to this area, in particular to the development of Post Traumatic Stress Disorder (PTSD) after MVAs (Blanchard, Hickling, Taylor & Loos, 1995; Blanchard, Hickling, Mitnick, et al., 1995; Bryant & Harvey, 1995b; Kuch, Cox & Direnfeld, 1995; Taylor & Koch, 1995).

This study intends to make a contribution in an area that has been understudied. With the introduction of a "No Fault" system of insurance in the province of Ontario in 1990, many victims of MVAs now have access to earlier psychological interventions. It is then imperative that clinicians have a better knowledge of the MVA population, of the symptomatology these individuals may present and of some of the variables that may contribute to the development and maintenance of psychological symptoms after MVAs. A better understanding of this population and their symptoms will facilitate the psychological assessment of the MVA victims and the development and implementation of assessment procedures and treatment intervention strategies specific for these individuals. The validity of assessments and interventions developed for traumatic reactions associated with one type of traumatic event (ie., war) cannot be assumed to generalize to other types of traumatic events (McCaffrey & Fairbank, 1985). This is particularly important when the traumatic event eliciting severe symptoms is a common occurrence, of relatively minor nature such as minor MVAs.

This study is focused exclusively on victims of minor MVAs (defined by the minor nature
of their physical injuries) in order to ascertain whether individuals involved in minor MVAs develop severe psychological symptoms. Of the many symptom types and combinations reported in the literature (Burstein, 1989; Goldberg & Gara, 1990; Kuch, 1987; Mayou, 1992; McNab, 1973; Smith, 1989) and observed in clinical practice (personal clinical experience), intrusion, avoidance, anxiety and depression seem the most appropriate to the study of minor MVAs. Intrusion symptoms involve recurrent recollections of an event including images, thoughts, dreams, flashbacks and/or other forms of reexperiencing the event. Avoidance refers to persistent avoidance of stimuli associated with the event and numbing of general responsiveness. Anxiety symptoms refer to feelings of apprehension caused by anticipation of danger frequently accompanied by physiological sensations. Depression symptoms include depressed mood with changes in activity level, cognitive abilities and vegetative functions (Kaplan & Sadock, 1991).

These four clusters of psychological symptoms: intrusion, avoidance, anxiety and depression will be investigated for severity in a sample of this population. The relationships between symptom severity and some vulnerability factors, which may account for their severity, will be explored. The vulnerability variables of interest include individual differences or pre-MVA variables, MVA variables and environmental or post-MVA variables.
CHAPTER 2

REVIEW OF THE LITERATURE

2.1 Physical Injuries After MVAs.

As previously stated, the majority of MVAs result in relatively minor physical injuries. In Ontario, reports from the Ontario Provincial Police indicate that in one year there were 200,855 cases of MVAs where injuries were minimal and did not require hospitalization (Ontario Ministry of Transportation, 1990). While injuries in MVA are diverse, most have a common element in that they result from sudden acceleration or deceleration forces acting upon the body during the impact of a collision. These forces cause injury by acting directly upon the body or by propelling the body against an object in the automobile. The accelerating forces are great enough to cause injury even in accidents that occur at relatively low speeds (McNab, 1973; Smith, 1989). The term "whiplash" has been used to describe the mechanism of these injuries which involves a sudden differential acceleration of the torso and the head causing flexion and hyperextension of the cervical region that results in damage to the tissues and structures of the neck (Teasell, McCain, Merskey & Finestone, 1991). In this manner the neck is forcefully extended beyond its physiological limits. The anatomical basis of whiplash has been demonstrated by experiments with monkeys (MacNab, 1964). In a MVA, whiplash is caused by combination of rear end collision with inadequately low headrests. The acceleration forces produce head and neck movements with a force that exceeds the capacity of protective neuromuscular reflexes. Soft tissue injuries are less common and less persistent after head-on and side-on collisions (MacNab, 1973). Intervertebral disc degeneration often occurs without
the associated clinical symptoms of whiplash (Hohl, 1974).

In addition to injuries to the spinal muscles and ligaments of the neck, the spinal cord may be stretched with strain transmitted to hypothalamic and other brain stem structures (McNab, 1964; Smith, 1989). Concussive injuries to the brain such as cortical contusions, anoxic lesions, edemas, intracranial haematomas may also result (Williams, Levin & Eisenberg, 1990). Individuals subjected to contact or acceleration/deceleration forces in MVAs may suffer Traumatic Brain Injury (TBI) and exhibit a cluster of symptoms named post-concussive syndrome including neuropsychological impairment. Mild TBI can occur due to impact to the head or through exposure to acceleration/deceleration forces, such as those in MVAs, without direct impact to the head. The severity of the TBI is generally defined by the acute injury characteristics (post-traumatic amnesia, loss of consciousness) and not by the severity of symptomatology after the trauma. The duration of unconsciousness is often brief, and in some cases there is no loss of consciousness but only a brief period of dazed consciousness (Alexander, 1995). A study by Povlishock, Becker, Cheng, et al. (as cited in Alexander, 1995) indicated that the primary neuropathology of TBI is diffuse axonal injury caused by shearing forces generated in the brain by sudden deceleration.

Post-concussive syndrome includes symptoms such as headaches, attentional deficits, poor concentration, forgetfulness, sleep-wake disturbances, dizziness, irritability (Alexander, 1995). Some of these symptoms are also considered manifestations of psychological distress. This possible overlap of symptomatology poses a substantial challenge to clinicians assessing and treating psychological sequelae and PTSD in particular, of physical traumas such as MVAs (Davidoff, Kessler, Laibstain & Mark, 1988). Thus the overlap in symptomatology between post-
concussive head injury and PTSD (attention and memory difficulties, emotional lability, disinhibition, avoidance, and loss of interest) needs to be considered for differential diagnosis (Meichenbaum, 1994). Scotti, Beach, Northrop, Rode & Forsyth (1995) strongly advise that the clinician screen for post-concussive syndrome whenever a case of accidental injury involves physical trauma to the head. Another potential symptom overlap occurs because individuals suffering TBI frequently develop depression and anxiety after the injury (Shoehuber & Gentilini, 1988).

Another of the common sequelae of MVAs is post-traumatic headache. Vijayan & Watson (cited in Hickling, Blanchard, Silverman & Schwartz, 1992) concluded that post-traumatic headaches are caused by either vasodilation, excessive muscle contraction, or scarring of the scalp tissues with entrapment of the sensory nerves at the site of injury. One study reports the incidence of post-traumatic headache following MVAs or industrial accidents as 72% (Jones & Riley, 1987). Parker (1977) suggested that headaches, in addition to being the most prevalent symptoms in a sample of 750 victims of industrial and motor vehicle accidents, were even more likely to occur if there had been no reported head injury.

2.2 Psychological Symptoms After MVAs.

2.2.1 Historical Background

The sequelae of transportation accidents began to be studied as early as 1880 when a distinct combination of physical and psychological symptoms resulting from these accidents was identified. This group of symptoms was given the label of "railway spine" (Trimble, 1981), because they commonly followed railway accidents. A similar condition was found in combat
veterans during World War I, and was labelled "shell shock." Shell shock was believed to be an organic brain injury caused by the changes in atmospheric pressure created by bombs (Keiser, 1968). Over time, several diagnoses have been applied to individuals suffering similar psychological symptoms resulting from accidents or from exposure to events unrelated to transportation accidents. Some of these changed categories and labels have created a great deal of controversy. After World War II, when more emphasis was placed on the psychological origins of somatic symptoms, labels such as "hysteria," "accident neurosis," "compensation neurosis," "traumatic neurosis" and others became prevalent. In 1980, the diagnostic term of "Post Traumatic Stress Disorder" (PTSD) was included in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM III, American Psychological Association, 1980) as an anxiety disorder in order to label the syndrome that developed after exposure to traumatic stressors. The Revised edition of the DSM III, the DSM III-R (American Psychological Association, 1987) expanded the classification of PTSD to include several behavioural, social and emotional abnormalities following exposure to a stressor outside the realm of normal experience and of sufficient magnitude to evoke stress in almost everyone. The stressor was defined to include a vast range of extraordinary experiences from combat to natural disasters and included major or severe motor vehicle accidents. This definition evidently excluded most road accidents given that these events are not outside normal experience but rather a common experience; for instance of the 178,515 MVAs that occurred in Ontario in 1991, 48.78% were MVAs in the minimal and minor categories compared to 4.54 % for the combined major and fatal categories (Ontario Ministry of Transportation, 1991). The stressor definition also excluded minor MVAs as a stressor serious or traumatic enough to evoke traumatic stress reactions. In
this way the "stressor criterion" in the DSM-III-R (American Psychological Association, 1987) prevented the application of the diagnostic label "Post Traumatic Stress Disorder" to individuals who suffered from the same symptomatology after a less severe MVA.

Motor vehicle accident victims, however, seem to develop some psychological trauma regardless of the severity of the stressor (the MVA) and of the physical injury sustained (Bryant & Harvey, 1995a; Goldberg & Gara, 1990; Jones & Riley, 1987; Interministerial Task Force, 1981; Smith, 1989). Many individuals suffer psychological distress after minor or non serious MVAs. One Australian study of 71 accident victims reported that all but five subjects developed psychological symptoms; approximately one third of these symptoms were considered disabling (Thompson, 1982).

2.2.2 Manifestation of Symptoms

The manifestation of psychological symptoms in MVA victims seems to be different when compared to other groups of accident victims. In a sample of 327 individuals involved in various types of civil accident litigation, Jones and Riley (1987) found a distinct group of individuals in whom neurotic features were more prominent than physical pain. This clinical group, identified by cluster analysis, was labelled the "phobic-motor accident" group as it was mainly consisting of MVA victims. Victims of MVAs seem to develop phobias with greater frequency than do victims of industrial accidents (Parker, 1977).

The duration of psychological symptoms resulting from MVAs has been reported to be long. Goldberg and Gara (1990) found a high proportion of patients who were seriously depressed a year or more after their accidents. An Ontario survey found that about one third of
those individuals requiring admission to a hospital after a MVA reported emotional after-effects four years after the accident (Interministerial Task Force, 1981). Similar findings were reported by Malt, Hoivik and Blikra (1993), who found that 31% of a sample of 183 adults had psychiatric problems three years after a MVA. The duration of psychological consequences seems to increase when individuals are involved in accidents with fatal consequences (Foeckler, Garrard, Williams, Thomas, and Jones, 1978; Lehman, Wortman & Williams, 1987).

The nature of the reported psychological symptoms is varied. Several clusters of psychological symptoms have been described in the literature as sequelae of MVAs. These clusters of symptoms are gathered under the labels of a simple phobia (Bryant & Harvey, 1995a), accident phobia (Kuch, Cox, Evans & Shulman, 1994), post traumatic phobias (Kuch, 1989b; Kuch, Evans, Watson, Bubela & Cox, 1991); post traumatic stress disorder (Blanchard, Hickling & Taylor, 1991; Burstein, 1989; Hickling & Blanchard, 1992; Kuch, Swinson & Kirby, 1985; Platt & Husband, 1987); subsyndromal PTSD (Blanchard, Hickling, Taylor & Loos, 1995), post traumatic headaches (Hickling, Blanchard, Schwarz & Silverman, 1992; Hickling, Blanchard, Silverman & Schwarz, 1992); stress-related post traumatic chronic pain syndrome (Muse, 1986); depression (Goldberg & Gara, 1990); post traumatic conditioning (Quirk, 1985); whiplash neurosis (Hodge, 1971); and psychosocial difficulties (Smith-Landsman et al., 1990). Smith (1989) has described two syndromes labelled as “Early Psychological Trauma” and “Delayed Psychological Reaction” resulting from MVAs. In addition to the numerous labels, Kuch (1989b) suggested that problematic anger is common in MVA victims as many survivors feel victimized by “the system.” He also referred to a cluster of symptoms given the label "compensation neurosis" and used it to identify individuals who become excessively involved in
and distressed by their medico-legal and rehabilitation process (Kuch. 1989b).

The two distinct syndromes described by Smith (1989) seem to encompass all of the above labels. He noted that the two syndromes may overlap. Early Psychological Trauma is characterized by symptoms which suggest psychological, neurological and psychosomatic etiologies. This syndrome is usually manifest by one week following the MVA. Victims suffering from early psychological trauma can be grouped according to their symptom presentation. Group one symptoms are related to aspects of the accident and are suggestive of an anxiety disorder as they include nervous tension, apprehension when driving, intrusive recollection and nightmares. Symptoms of group two seem related to mild trauma in the brain and brain stem and include dizziness, confusion, attention, concentration and memory difficulties, nausea, vertigo, irritability and certain sleep disturbances; victims of this group also report sudden depression which is said to be precipitated by the physical trauma (Culpan & Taylor. 1973). Symptoms of group three include headache, neck pain, fatigue, insomnia and complaints of pain which are disproportionate to physical findings. These symptoms are said to be related to whiplash types of injuries. The second syndrome described by Smith (1989), Delayed Psychological Reaction, is considered to be an adverse adaptation to the situation created by the accident and the injury. Psychosocial factors such as the inability to satisfy social and family demands, loss of work, financial difficulties and involvement in medico-legal activities, have a significant impact. Delayed reactions may take the form of depression, chronic post traumatic anxiety, hostility, malingering and reactive somatoform disturbances including "reactive hypochondriasis" and "chronic pain syndrome."

The above section reviewed most of the many diagnostic or descriptive labels of the
psychological symptoms, psychological-physical conditions, psychological syndromes and other combinations found in the MVA related literature. The following section will review the findings related to the three most common symptom clusters which are of interest in this study: Depression, Anxiety and PTSD.

2.2.3 Depression

Chronic and serious depression can develop during the course of recovery from MVAs. Depressive states may arise from the pain from physical injuries, from difficulties accepting the loss of bodily function and from new physical limitations. Besides physical pain and physical limitations, other factors such as loss of status and family role, financial insecurity, inactivity and forced dependency can also contribute to depression (Smith-Landsman et al., 1990).

In minor MVAs, although day to day functioning may be little changed by an injury, the victim's appraisal of his or her circumstances may be that he or she will never be the same as before the MVA and this can precipitate grieving and potentiate adult developmental crises (Smith, 1989). In some cases where there may be personal or cultural constraints to the admission of psychological difficulty some patients may label their depression as pain and thus their masked depression is not recognized or treated (Farban, 1973). Minimal physical impairment and masked depressive symptoms may explain the scarcity of studies addressing the development of depressive symptoms after MVAs although the incidence of depression seems significant. Goldberg & Gara (1990), in one of the few studies of victims of MVAs who did not suffer major physical injuries, found that the group composed of patients with depressive features was the most common in his sample, outnumbering patients presenting with features of PTSD.
by a ratio of 3:1.

Depression has been found to be interrelated with PTSD in MVA victims. In a study of 158 MVA victims, Blanchard, Hickling, Taylor & Loos (1995) found that those MVA victims with PTSD were more likely to also meet the criteria for diagnosis of major depression and that most (81.8%) of those depressions developed after the MVA.

2.2.4. Anxiety: Phobias and Panic

Victims of MVAs develop post traumatic phobias and panic disorders (Blonstein, 1988; Jones & Riley, 1987; Kuch, 1989a; Kuch et al., 1991; Kuch et al., 1994; Munjack, 1984; Quirk, 1985). These conditions cause symptoms on a lesser scale than PTSD but also contribute to post accidental chronicity and interfere with the individual's adjustment following the MVA (Kuch, 1989b).

Phobias are characterized by irrational fears evoked by a stimulus that is commonly regarded as harmless and by an intense urge to avoid the feared object, activity or situation (Kaplan & Sadock, 1991). Distress may reach the level of panic with accompanying physiological arousal. Post traumatic phobias and PTSD share a common characteristic, that is, the reactivity to reminders of the stimulus. In the case of MVA victims, circumstances reminiscent of the MVA trigger physiological symptoms such as trembling, sweating, palpitations, and respiratory distress even when there is no real danger. These symptoms may culminate in a typical panic attack. Phobic anxiety is compelling and leads to precautions which are unrealistic and excessive to the situation, or the avoidance of the feared situation entirely. Individuals with MVA related phobias avoid situations that remind them of the MVA and
sometimes avoid driving or riding in cars for years. These precautions and avoidant behaviours may compromise work, family life and leisure activities. Anticipatory anxiety of driving may lead to secondary symptoms such as insomnia and phobic driving avoidance which may create distress and inconvenience in activities not necessarily related to driving (Kuch, 1989b).

Phobias resulting from MVAs can be understood in the context of the classical conditioning model as an association formed between the circumstances of the accident and the intense feeling of dread experienced during the accident. Traumatic conditioning takes place in a single learning experience, the moment of the MVA, and at a very high learning rate (Quirk, 1985). Individuals may thus develop specific phobic reactions associated with the circumstances of the accident, i.e., reactions to snow or rain, to the sound of sirens or to the sound of brakes as would be predicted by the learning model. Previously neutral cues associated with automobile travel then become conditioned by aversive stimuli and evoke a defensive reaction in anticipation of another accident. The avoidance behaviours are subsequently strengthened by reinforcement. This model, however, offers only a partial explanation of phobic reactions as it does not explain why some survivors of MVAs develop phobias while others do not. It has been suggested that patients who develop phobias after minor traffic accidents may have a greater vulnerability to phobic disorder (Kuch, 1989b). Quirk (1985) suggested that minor rear end collisions are the most common source of traumatic conditioning as they create stimulus conditions, such as confusion, that may facilitate the formation of such conditioning. Kuch (1987) reported that phobic symptomatology resulting from MVAs is distressing, disabling and may be a leading cause of post traumatic "psychogenic" disability. Kuch (1989b) also noted that post traumatic phobias have received little attention in the literature in spite of their impact on rehabilitation, of
their possible role in the development and maintenance of Post Traumatic Stress Disorder and regardless of the fact that phobias have a general good prognosis.

Upon comparison, phobias seem to be more common in MVA victims than in victims of other types of accidents. For example, Parker (1977) reported that the prevalence of phobic disorder was more than five times higher after a MVA than after an industrial accident. Hoffman (1986) reported that although a small percentage of his sample of accident victims (referred patients) met the criteria for PTSD (10%), victims more frequently suffered from depression, chronic pain syndromes and specific post traumatic phobias. Post accident driving fears were reported by 19% of the respondents to a survey in Ontario and these emotional consequences seemed to occur independent of the severity of the physical injury sustained (Interministerial Task Force, 1981). Accident-related simple phobias are more prevalent in populations MVA patients with chronic pain with percentages ranging from 38% to 60% (Hickling, Blanchard, Silverman, & Schwarz, 1992; Kuch et al., 1991; Kuch et al., 1994).

2.2.5 Post Traumatic Stress Disorder

Post Traumatic Stress Disorder (PTSD) as a diagnosis has been applied to war veterans (Keane, 1989), survivors of natural disasters (Glessner, Green & Vinget, 1981), survivors of rape (Kilpatrick, Veronen & Best, 1985), victims of political persecution and torture (Fasic, 1987), survivors of childhood incest and wife battering (Donaldson & Gardner, 1985, Dutton, 1992) and to family members of homicide victims (Rynearson, 1984). The diagnosis of PTSD has also been applied to victims of various types of accidents including MVAs (Blanchard et al., 1991; Burstein, 1989; Hickling & Blanchard, 1992; Kuch et al, 1985; Platt & Husband, 1987).
Apparently, the population that develops PTSD as a result of a MVA is a distinct subgroup, differing in the character of their intrusive and avoidance symptoms from those who develop the disorder as a result of war trauma (Burstein et al., 1988). Despite the estimation that 550,000 individuals annually experience acute PTSD precipitated by an MVA in U.S.A. alone, the literature contains few publications describing the occurrence of PTSD in this group in comparison to literature on PTSD in victims of other traumas (Burstein, 1989).

Few disorders include an etiological variable in the criteria for diagnosis. According to the Revised edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM III-R, American Psychiatric Association, 1987), the required etiological variable for the diagnosis of PTSD was the "exposure to a psychological distressing event that is outside the range of usual human experience" and that "would evoke distress in almost everyone" (American Psychiatric Association, 1987, p.247). This diagnostic requirement may explain in part the lack of attention given, until recently, to victims of MVAs suffering PTSD. By defining the stressor in these terms, the diagnosis of PTSD was excluded for individuals suffering similar symptoms following the "common" event of a minor motor vehicle accident and reserved the diagnosis for similar reactions caused only by major, severe and less common MVAs. This diagnostic criteria had another shortcoming when applied to the MVA population: it did not explain why some victims exposed to severe MVAs, extraordinary events, developed PTSD while other victims did not; nor did it explain why some individuals develop PTSD symptoms when exposed to minor MVAs, one of the more "ordinary" stressors in our present society. The stressor discrepancy was studied by Solomon and Canino (1990), and their results indicate a closer relationship between PTSD symptoms and measured symptoms resulting from exposure to some common events than to
symptoms precipitated by extraordinary events. Other studies have questioned the validity and usefulness of this diagnostic criterion previously in use as an appropriate measure of trauma-related distress (Breslaw & Davis, 1987; Feinstein & Dolan, 1991).

A revision of the diagnostic criteria was undertaken for the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994) and the criteria required for the diagnosis of PTSD now takes in consideration the subjective experience of the individual confronting a stressor that need not to be extraordinary. The individual’s experience relates to the threat posed by an event “that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others” as well as to the person’s response to the event involving “intense fear, helplessness, or horror” (American Psychiatric Association, 1994b, p. 209). The recent DSM-IV changes in the diagnostic criteria for PTSD shifting the focus from the stressor to the individual’s experience and the inclusion of a new diagnostic category, Acute Stress Reaction, are likely to more reasonably capture the severe stress reactions developed after minor MVAs.

2.3. Etiological Models of Post Trauma Reactions

Theories of etiology from different theoretical perspectives have attempted to provide a framework within which to understand certain aspects of post trauma reactions. The most notable of these theories focuses on cognitive-affective (information processing), psychosocial or behavioral variables. These theories are particularly relevant to the study of stressful reactions after ordinary stressors such as a minor MVA, as they give insight into the intrapsychic and psychosocial variables affecting such reactions. Within the field of trauma research the
information processing model presented by Horowitz (1973, 1974, 1976, 1979, 1986) and the psychosocial framework outlined by Green, Wilson and Lindy (1985) have been among the most influential and provide an adequate theoretical framework for this study. Hence, a brief review of these theories will be provided as background.

2.3.1 The Information Processing Model

Horowitz's (1976, 1979) model places a major emphasis on information processing and cognitive theories of emotion. Horowitz (1979) explains that traumatic events involve a massive amount of internal and external information, most of which is not assimilated by the person's cognitive schemata. Information overload results as the person's ideas, affect and images are not integrated and thus remain in an unprocessed and active form outside of awareness. Denial and numbing are employed as defenses to keep the traumatic information outside awareness. However, as the information is processed, it becomes consciously acknowledged at times, and experienced as "intrusions." Intrusions take the form of memories, flashbacks and/or nightmares. During these intrusive episodes the ego experiences an information overload again and numbing and denial are once more employed as coping mechanisms. This cycle of intrusion and denial-numbing continues until full integration of the traumatic material is accomplished. At this point, the traumatic information becomes part of the long term models and inner schemata of the individual. An important factor in Horowitz's approach is that it is not focused exclusively on Vietnam veterans' traumatic reactions. Unlike most other studies on PTSD, his focus has been on victims of crime, accident victims and victims of traumatic loss. Horowitz has created a widely used measure, the revised Impact of Event Scale (Horowitz, Wilner & Alvarez, 1979),
to assess the degree of the post traumatic symptoms of intrusion and avoidance or numbing.

2.3.2 The Psychosocial Model

The psychosocial model proposed by Green, Wilson and Lindy (1985) focuses on the interaction of the traumatic stressor. "normal" reactions to trauma, individual characteristics, and the social and cultural environment in which the trauma is experienced and the patient recovers. This model builds on the information processing model proposed by Horowitz (1976, 1979) and seeks to account for the fact that certain persons exposed to trauma develop PTSD and others do not. This model suggests that after a traumatic event a person experiences a psychic overload until the trauma can be successfully integrated. Failure of ego defenses and coping mechanisms lead to an inability to process the experience. The possibilities of processing and integrating the information overload and thus working through the trauma, are enhanced in a favourable recovery environment and reduced in an unsupportive environment. Along with the traumatic reaction, this model considers individual differences and the recovery environment and thus seems to be an appropriate theoretical framework to fully investigate the experience of a victim of a minor motor vehicle accident where the recovery environment is at times conflicted with medico-legal difficulties.

2.4 Variables Mediating Post Traumatic Reactions

2.4.1 Trauma Characteristics

Research shows significant relationships between the characteristics of the traumatic incident and the type or severity of the symptomatic response. Wilson, Smith & Johnson (1985)
proposed that certain characteristics of the stressor such as the duration of trauma, the severity of threat and loss, the potential for recurrence and the role of the person in the trauma, are related with particular PTSD symptomatology among various survivor groups. Allodi (1974) found that the circumstances of the traumatic experience and the psychological threat posed by the accident were the variables most significantly related to psychiatric impairment after industrial and motor vehicle accidents. The extent and severity of combat exposure have been found to be some powerful antecedents of PTSD symptoms in war veterans (Barret & Mizes, 1988; Foy, Sipprelle, Rueger & Carrol, 1984). Studies with victims of rape also support the importance of stressor severity and of the subjective appraisal of a life threat in the development of emotional problems after trauma (Kilpatrick et al., 1985; Kilpatrick, Saunders, Amick, Veronen & Resnick, 1989; Veronen & Kilpatrick, 1980).

The Appraisal of Death Threat: The cognitive appraisal of danger to one's life and physical integrity has been a common factor in the attempts to understand post traumatic reactions and the development of psychological symptoms. The victim's experience of the threat of annihilation has been a criterion for the label "traumatic neurosis" (Keiser, 1968) and "cryptotrauma" (Pilowsky, 1985). In a study of the effects of crime on women, Kilpatrick, Saunders, Amick-McMullan, Veronen, & Resnick (1989) found that the one factor that most correlated with PTSD was the cognitive appraisal that the victim was in danger of serious personal injury or loss of life. Allodi (1974) arrived to a similar conclusion with his combined sample of victims of industrial and severe MVA accidents. He found that the threat posed by the accident and its circumstances were significantly related to psychiatric impairment after the accident. Interestingly, when the stressful event is less extraordinary or potentially traumatizing
than rape or war, it has been argued that the true nature of an accident from the patient’s perspective, that is the emotional trauma associated with apparently “trivial” industrial accidents, is often overlooked due to the victim’s tendency to suppress the most horrifying aspects of their experience (Pilowsky, 1985). This situation is likely to be found also in victims of minor MVAs who, regardless of the low severity of the MVA, may have had a horrifying experience, including a threat of death.

**Reactivation of Traumatic Memories:** The perception of danger or even the perception of a threat of death during the experience of a minor MVA may have a stronger impact in the development of psychological symptoms when accompanied by reactivation or recall of memories of past traumatic events. Mood congruent memory theory (Blaney, 1986) postulates that there is an increased likelihood that stressful or traumatic material from the past will be recalled when a person is experiencing a similar cognitive-emotional state in the present. Similarly, evolutionary perspectives propose that the evolution of the human mind has proceeded in a way that previous life events which were accompanied by profound emotional impact and threat will be recalled whenever a cognitive-emotional state similar to that evoked by the original major stressor is instigated. These perspectives suggest that the recalling of major events is adaptive and therefore has been selected as an enduring cognitive-emotional human trait (Oatley & Duncan, 1992; Oatley & Jenkins, 1992). This process can be considered adaptive since remembering such information from the past may facilitate adaptive coping with current trauma by recalling responses used to survive or cope more or less successfully.

It has also been suggested (Teasdale, 1988) that emotion related memory is one mechanism by which life stressors have ongoing influence on daily emotion and mood. In normal
subjects such memories may serve to exacerbate and maintain negative emotions and moods and in psychiatrically diagnosed individuals it may exacerbate and maintain the psychiatric disorders. For instance, Long, Chamberlain and Vincent (1994) found that media coverage of recent warfare (The Gulf war) reactivated memories of earlier combat in Vietnam veterans and that these memories increased PTSD levels.

It has been observed that victims of minor MVAs experience, to their surprise, vivid memories of stressful or traumatic events from their past as result of the MVA (personal clinical experience). These memories manifest during conscious awareness or in dreams where symbols of present and past traumas are combined. Based on mood congruent theory, it is reasonable to assume that the MVA experience has been able to create a cognitive-emotional state similar to the previous trauma that has evoked the recall of such trauma. These processes need attention as they may be able to account for some of the heightened severity of psychological symptoms following minor MVAs when the MVA victim has experienced previous traumatic events. No research has been done in this area with victims of MVAs.

2.4.2 Individual Differences

Few studies have investigated individual differences as predisposing factors to the development of psychological symptoms in victims of motor vehicle accidents. Blanchard, Hickling, Taylor and Loos (1995) suggested that a prior history of major depression appears to be a risk factor for developing PTSD after a MVA. A prior history of PTSD from earlier trauma has also been associated to the development of PTSD after a MVA (Blanchard, Hickling, Taylor Loos & Gerardi, 1994). Similarly, it has been suggested that past history of anxiety disorder may
predispose toward fear acquisition in a MVA (Kuch et al., 1995). Personality disorders were not found to be more prevalent in MVA victims with PTSD than in those without PTSD (Blanchard, Hickling, Taylor & Loos, 1995).

Earlier studies with mixed samples of victims of MVAs and other accidents and with victims of other trauma have reached different conclusions. In a combined group of victims of industrial accidents and motor vehicle accidents, Allodi (1974) found that psychiatric history was not related in a significant way to post accident psychiatric disability. Related research on posttraumatic reactions following traumatic events such as fire, rape and war, has been inconclusive with respect to predisposing factors such as personality or psychiatric history in the development of PTSD. For instance, premorbid adjustment problems or personality problems were not characteristic of war veterans who developed PTSD (Hyer et al., 1986). No differences were found in pre-trauma adjustment between veterans with and without PTSD (Foy et al., 1984) and no association was found by Feinstein & Dolan (1991) between premorbid personality disorders and development of PTSD after a traumatic event. It has also been suggested that the psychiatric history of rape victims was not related to adjustment following trauma (Kilpatrick, Veronen, et al., 1985).

On the other hand, more recent studies found that past personal or family history of psychiatric disorder was significant in the development of PTSD in a group of fire fighters exposed to a bushfire disaster (McFarlane, 1988a). Positive family histories of psychopathology including alcoholism, depression and anxiety disorders were found to be significantly more common in war veterans with PTSD. (Davidson, Swartz, Krishnan, & Hammett, 1985; Foy et al., 1987). In a sample of the general population, vulnerability to the effects of traumatic events
was found to be significantly higher in those individuals with a family history of anxiety, depression, psychosis and antisocial behaviour and in those persons with a preexisting diagnosis of anxiety or affective disorder (Breslau, Davis, Andreski, & Paterson, 1991). These conflicting findings keep alive the longstanding debate about the relative importance of the traumatic event versus premorbid psychological problems in the development and maintenance of symptoms after trauma. Pynoos et al. (1987) proposed that individual vulnerability factors have a more significant influence as the severity of the trauma and the intensity of exposure to the trauma decreased.

In terms of personality traits, lower levels of neuroticism and psychoticism were found to be protective in war veterans who did not develop PTSD in spite of high combat exposure (Casella & Mota, 1990). A study conducted by McFarlane (1989) indicated that neuroticism was a better predictor of post traumatic morbidity than the degree of exposure to a disaster. Breslau et al., (1991) found that traits such as extroversion and neuroticism increased the risk for exposure to traumatic events but were not associated to vulnerability to develop PTSD following traumatic events. Similarly, personality factors have been found to contribute to the possibility of involvement in MVAs or “MVA proneness” (Berger, 1975; Botero, 1986; Conger et al., 1959; Noyes, 1985) but not found associated to the development of PTSD after a MVA (Blanchard, Hickling, Taylor et al., 1995).

The characterological cognitive style of the individual that has been exposed to traumatic events has been given attention for its role in maintenance of psychological symptoms (Horowitz, 1986). Patients with hysterical styles tend to process information in an impressionistic manner and also tend to give more weight to feelings that ideas. In contrast, people with obsessional
styles process information focusing on isolated ideas or feelings without seeing an overall context. These characterological traits may interfere with the completion of processing and integration of the traumatic information and thus prevent working through the trauma. However, it is likely that the characterological style of the individual in interaction with the trauma recovery environment determine the ease with which an individual is able to work through a traumatic experience.

Relative to preexisting personality traits potentiating the development of psychological symptoms after trauma, is the notion of experiencing prior stressful events that may make a person more vulnerable to trauma and affect her or his appraisal of the traumatic situation.

2.4.3 Pre-Trauma and Post-Trauma Experiences

Research on the effect of pre-trauma experiences as contributors to the development of distress after trauma is inconclusive. Some studies indicate that some pre-trauma experiences, such as educational history, trouble with authorities, and prior substance abuse, are not related to development of PTSD in Vietnam veterans (Foy et al., 1984; Foy, Carroll, & Donahoe, 1987; Penk et al, 1981; Roberts et al, 1982). However, studies of different trauma groups have shown evidence of some pre-trauma risk factors. Davidson, Hughes, Blazer and George (1991) reported that parental poverty and childhood abuse are significant pre-trauma risk factors. Other researchers have focused on adverse or traumatic life events.

Previous Trauma: Green, Wilson and Lindy (1985) suggest that prior exposure to traumatic incidents may increase vulnerability to PTSD. McFarlane (1988b), in his study of bushfire victims, found that individuals with chronic PTSD experienced more adverse life events.
both before and after the fire. Similarly, Scotti et al., (1994) reported that persons involved in severe accidents were more likely to have experienced a greater number of other types of trauma prior to the accident. Blanchard et al.(1994) found that victims of severe MVAs who developed PTSD were more likely to have experienced previous trauma and to have been diagnosed with PTSD as a result of the previous trauma.

**Post-Trauma Environment:** Characteristics in the immediate post-trauma environment may contribute to or deter a favourable outcome following the experience of a traumatic event. Although environmental or consequential variables are not etiological, they seem to play a significant role in symptom development and maintenance. Exposure to stressful life events after the development of PTSD has been found to exacerbate or even maintain PTSD symptomatology (Green & Berlin, 1987). In rape victims, consequential variables found to influence outcome are guilt and self-blame (Libow & Doty, 1979), and in Vietnam veterans, the variables that have been found to modify the relationship between the traumatic event and the development and maintenance of PTSD symptoms are lack of social support after the trauma (Barret & Mizes, 1988; Foy et al., 1984; Keane, Scott, Chavoya, Lamparsky & Fairbank, 1985), lack of societal acknowledgment and a hostile recovery environment (Stretch, 1990).

On the positive side, instrumental support and psychological support were perceived as conducive to improved coping after trauma in a group of Holocaust survivors (Nadler & Ben-Shushan 1989). Social support has frequently been identified as a significant moderating variable in the recovery of post-trauma reactions (Barlow, 1988; Barret & Mizes, 1988; Green & Berlin, 1987). Social support is thought to “buffer” the effects of a traumatic experience (Cohen & Wills, 1985; Solomon, 1986). It has been suggested that if social support is not adequate
following the trauma of war and natural disaster, the risk of pathological adjustment is accentuated (Barrett & Mizes, 1988; Madakasira & O'Brien, 1987; Stretch, 1990). In terms of MVA related trauma, Foeckler et al. (1978) found that the support of family, friends and significant others was the most important variable in the resolution of the crisis after a MVAs involving fatalities.

Social support has been defined in various ways and there is debate over the role of perceived versus received support in the recovery from trauma. It has been suggested that it is more useful to ask about received support (support actually received when needed) than about perceived support (support perceived to be available if needed) to victims of disaster (Joseph, Andrews, Williams & Yule, 1992). This may also be the case with victims of MVAs.

The benefits of social support are based on the assumption that the interactions are positive. Relationships that facilitate the expression of thoughts and feelings regarding the traumatic event will have more positive effect than those that reinforce denial or numbing by minimizing the survivors experience (Solomon, 1986). However, not all relationships are supportive and many relationships constitute added stressors since they place high or conflicting demands on the individual (Gottlieb, 1985). In some cases negative relationships explain more of the variance in adjustment to trauma than positive relationships (Shinn, Lehmann & Wong, 1984; Wortman, 1984). Simultaneous study of both positive and negative relationships in the recovery environment following trauma will likely produce more accurate predictions. These environmental variables may be particularly pertinent to the MVA victim’s post-accident environment which may involve an element of confrontation with the insurance system as the victim attempts to obtain benefits and/or is involved in litigation procedures. Thus, it is
reasonable to assume that the MVA victim may have to deal with a recovery environment where there is potential for negative and positive relationships simultaneously affecting the individual. Therefore, the effects of received support and received hostility in the recovery environment of MVA victims need special attention. The role of a supportive or hostile recovery environment has not been studied in victims of motor vehicle accidents.

Although it is difficult to advance generalizations about risk factors for high symptomatology from studies based on trauma of different nature and magnitude, in general these data suggest that diagnosed premorbid psychological conditions of the individual may predispose to similar disorders (PTSD, major depression, phobic disorders) but that previous psychological difficulties may not be necessary for the development of severe symptoms after exposure to traumatic events. Personality traits may be a factor in “proneness” to MVAs but not in the development of psychological morbidity after a MVA. Data also suggests that environmental variables such as preexisting stressful life events (poverty, psychopathology in the family, previous traumatic experiences) may increase vulnerability to the development of psychological symptoms after trauma. Finally, it points to the importance of the recovery environment namely, the detrimental effects of adverse life events following the trauma and to the beneficial effects of social-support. All of the above factors may have a different degree of influence in the psychological sequelae of stressors when considering and controlling for the nature and magnitude of the stressful event.

Additional research is needed with consideration to pre-trauma, trauma and post-trauma factors in their role as mediating and possible potentiating variables in the development and/or maintenance of psychological symptoms after minor stressful events. This model, considering not
only pre-trauma and trauma factors, but also post-trauma variables combined maybe particularly relevant with the MVA population where the post-trauma environment may be depriving or even hostile. Pre-MVA and MVA variables may contribute to and explain the symptomatology in victims of MVAs as it has been suggested in some research studies reviewed, however, it is also necessary to consider that MVA victims may be experiencing a hostile recovery environment in addition to being affected by the consequences of the motor vehicle accident (physical pain, rehabilitation activities, work disruption, financial difficulties).

2.5 Rational for the Study

Unlike major traumatic events, ie., war or rape, many motor vehicle accidents are of a relatively minor nature and would not in themselves be a cause of significant symptoms of distress in most people. However, it has been noted that irrespective of the apparent minor or "trivial" nature of some accidents, individuals experience severe emotional consequences (Pilowsky, 1985). This occurrence has also been observed with victims of minor MVAs; frequently, individuals who are involved in the very same minor accident present different reactions to the event and while some develop severe psychological symptoms others do not experience significant psychological distress (personal clinical experience). Much can be learned from comparisons between individuals who developed severe psychological distress with those who developed moderate or even minimal levels of psychological symptoms when involved in MVAs of similar severity.

Recent studies on MVA victims have looked at samples of mixed accident severity as assessed by the severity of their injuries. The samples in these studies included victims who had
been hospitalized (Blanchard, Hickling, Mitnick et al., 1995; Blanchard, Hickling, Vollmer et al., 1995; Bryant & Harvey, 1995a; Green, McFarlane, Hunter & Griggs, 1993; Mayou, Bryant & Duthie, 1993), and victims who had lost consciousness (Blanchard, Hickling, Taylor et al., 1995; Goldberg & Gara, 1990). In contrast, the present study will focus specifically on minor motor vehicle accidents as defined by the minor degree of physical injury and medical intervention (no hospitalization, no loss of consciousness).

The primary purpose of this study is to determine whether individuals involved in a minor MVA develop severe psychological symptoms as a result of this experience. Once this becomes established, this study will focus on attempting to identify some of the individual differences and environmental factors which may significantly relate to, and account for the development of severe psychological symptomatology after a minor MVA.

Most studies focusing on the psychological symptoms that develop from involvement in a MVA have looked into diagnosed PTSD or a "subsyndromal" or partial form of PTSD (Blanchard, Hickling, Taylor et al., 1995; Kuch et al., 1995; Taylor & Koch, 1995). These diagnostic labels have been subject to many changes and have generated some confusion in the past, for example, the constraints of the past diagnostic criteria of PTSD (DSM III-R), namely the exclusion of minor MVAs as an extraordinary stressor; the recent changes to the diagnostic criteria in the DSM IV; the fact that certain tests scoring rules change the proportion of diagnosed cases and thus the incidence and severity of diagnosed PTSD after MVAs (Blanchard, Hickling, Taylor, Forneris, et al., 1995); the fact that the PTSD label is applied to a multisymptomatic disorder, and most significantly, the fact that PTSD is not the only psychological disorder developed after MVAs (Goldberg & Gara, 1989; Kuch et al., 1995; Smith, 1989). In
view of the above and for clarity purposes, the post-MVA psychological symptoms in this study will be examined as clusters of symptoms without any attempt to attribute a diagnostic level. The clusters of interest in this study are depression, anxiety, intrusion and avoidance.

What makes the experience of a minor MVA traumatic for some individuals and not for others may be the cognitive appraisals of a life threat during the collision. It has been suggested by Kilpatrick (cited in Peterson, Prout, & Schwartz, 1991) that if forced to ask only one question in the assessment of individuals involved in a traumatic event, the question would be whether the individual ever felt that she or he was in jeopardy of serious personal harm or loss of life. This question will be asked in this study to assess the severity of the stressor as experienced by the MVA victim.

Exposure to previous traumas has been credited with both increased vulnerability and inoculation effects in victims of trauma other than MVA (Green, Wilson & Lindy, 1985). In a recent study, Blanchard et al., (1994) found that MVA victims diagnosed with PTSD were more likely to have experienced other trauma previous to the MVA. Exposure to life trauma previous to the recent MVA will be studied in relationship to the development of psychological symptoms after the minor MVA. The possible reactivation of memories of previous traumatic events instigated by the MVA will be explored.

The victim's perception of received support and received hostility in the recovery environment after the minor MVA will be examined given the reported importance of support and lack of support (Nadler & Ben-Shushan, 1989; Barlow, 1988; Barret & Mizes, 1988; Ganellen & Blaney, 1984; Green & Berlin, 1987) and of hostility (Stretch, 1990) found in studies with other groups of survivors of stressful events. The recovery environment of a MVA victim
may be unsympathetic or hostile to the victim's complaints and symptoms following such minor event and thus may have an effect on the psychological symptomatology of the victim.

Most research that has focused on individual differences as pre-trauma vulnerability has attempted to find prior pathology in the individual (history of PTSD, depressive or anxiety disorders) to explain post-trauma distress. On the positive side, few studies have looked at normal aspects of personality as contributors to the positive adjustment and to prevention of disease after stressful events (Kobasa, 1979; Kobasa & Puccetti, 1983). Specifically with the MVA population, no studies were found addressing the influence of normal personality factors on the psychological reactions to a MVA. Normal personality factors are outlined by the Five Factor model of personality (Digman, 1990). One of these normal personality factors is called neuroticism and refers simply to a vulnerability to stress or a tendency to experience negative affects (Costa & McCrae, 1992). This aspect of personality will be studied in regards to its relationship to the development of psychological symptoms after a minor MVA.

This research addressed four general questions: First, do individuals involved in a minor MVA develop psychological symptoms in the severe range as result of the MVA. Second, how do individuals with severe psychological symptoms differ from those individuals who develop moderate or minimal levels of psychological symptoms after a minor MVA. Third, how do some of the vulnerability factors thought to potentiate the development of psychological symptoms in victims of other stressful events, apply to a group of individuals involved in minor MVAs and differentiate their degree of psychological symptomatology. Fourth, are there any factors that can be thought of as being protective in the development of psychological symptoms after a minor MVA.
The intervening variables considered in this research are organized into three categories: Pre-MVA variables, MVA variables and Post-MVA variables. The Pre-MVA variables include a personality factor, vulnerability to stress, and two types of previous experiences before the MVA: previous traumatic events and previous death threats. The MVA variables are the experience death threat at the MVA and the reactivation of memories of previous traumatic events as a result of the MVA. The post-MVA variables include the support and hostility the participant received from his or her family environment and MVA related recovery environment, namely, medical and insurance environments.

The specific hypotheses to be tested are:

**Hypothesis 1.** Individuals involved in minor MVAs develop psychological symptoms ranging from none to moderate and severe as assessed by the Revised Beck Depression Inventory, the Beck Anxiety Inventory and the Revised Impact of Events Scale.

**Hypothesis 2.** The group of participants developing severe psychological symptoms following a minor MVA will differ from the group with minimal or no symptoms in the intervening variables. The severe symptom group will present: Higher vulnerability to stress (as measured by the neuroticism scale of the NEO-FFI); greater exposure to traumatic events and experiences of death threats prior to the MVA (as measured by the TSS); greater incidences of a death threat during the MVA and of reactivation of traumatic memories with the MVA (as reported); higher levels of hostility and lower levels of support in the recovery environment from family, medical and insurance related environment (as measured by the Support-Hostility Questionnaire).
Hypothesis 3. Hostility in the recovery environment will account for more of the psychological symptom variance of the MVA sample than support in the same environment.
CHAPTER 3

METHODOLOGY

3.1 Participants

Participants in this study represented a sample of the population of MVA victims who have been involved in minor motor vehicle accidents. The minor severity of the MVA was defined in terms of the severity of the physical injury sustained in the accident and not in terms of the damages to the vehicle as is the common criteria used by insurance practices. Victims of minor MVAs were considered those individuals that sought and received medical attention immediately (within 24 hrs) as result of their accident but were not hospitalized (admitted to a hospital for an overnight stay or longer). Examinations in the emergency department at any hospital (without admission) after the accident were considered part of the medical attention received.

The inclusion criteria consisted of four requirements:

1. Age: Subjects were adults between the ages of 18 and 65 who had been involved in a minor MVA. The limit of age 65 was included in order to prevent memory loss interfering with some of the reports from participants about the circumstances of the accident and/or on the retroactive nature of the symptom measures. The age 18 was selected as a cut off point because the standardized measures used in this study are for adults and are, in most cases, validated on individuals 18 years and over.

2. Elapsed time since the accident: Participants were involved in a minor MVA more than six months but less than three years prior to the collection of the data. Recent MVA victims (less than six months) were excluded to avoid the most acute phase of recovery from the accident and
to avoid unnecessary discomfort to persons who have recently suffered injury. Also, part of the information sought was the presence of psychological symptoms following the MVA. Some individuals do not immediately develop psychological symptoms after a stressful event (i.e., delayed post traumatic stress disorder or reactive depression). A limit of three years following the accident was included to prevent memory loss affecting the reports from participants on the retroactive symptom measures and on the account of their circumstances after the accident.

3. Loss of consciousness: Subjects did not experience loss of consciousness during or after the MVA. This criterion was included in order to minimize the effect of organic factors (resulting from traumatic brain injury) on the reported psychological symptomatology resulting from the experience of the MVA. For instance dizziness, an anxiety item in the BAI, is a common symptom after concussion. Although it is reported that minor head trauma may result from rotation and acceleration forces without loss of consciousness (Alexander, 1995; Sweeney, 1992), this was clearly the best criterion to attempt to exclude the population where minor head injury may have occurred after a minor MVA.

4. Litigation: Subjects were not currently involved in litigation. Although the literature suggests that resolution of law suits does not affect the course of psychological symptoms (Balla & Moriatis, 1970; Binder, Trimble, & McNeil, 1991; Kuch, 1987; Mendelson, 1982), that the proportion of malingering is small and compensation factors are not significant in the development of psychological symptoms (Binder et al., 1991; Burstein, 1986, 1989), an extra effort was made to exclude people who were involved in litigation. Litigation was defined for the purpose of this study as the involvement in formal legal procedures to sue the insurance company for permanent ("Tort") damages under the current legislation. Individuals who had
sought the advice of, or had hired legal assistants or lawyers to help them with a non litigious matter such as obtaining information, liaison with the insurer or processing forms to collect temporary disability benefits such as income replacement, supplementary medical benefits and/or rehabilitation benefits, were included in the study.

3.1.1 Recruitment

Subjects were recruited through ads and pamphlets (Appendix A) requesting volunteers which were placed at offices of physicians in general practice (family doctors), rehabilitation clinics and bulletin boards of university campuses. General practitioners were approached in order to reach the MVA victims who were in medical treatment but beyond the active rehabilitation treatment phase (i.e., two and three years after the accident), and victims who had recovered. Rehabilitation clinics were approached to obtain a sample of the MVA population who was still in treatment. Ads placed at University campuses attempted to obtain a sample of MVA victims who were not in medical treatment and were back to their normal graduate and undergraduate school activities.

Doctors were approached in writing with a letter explaining the request and a brief summary of the proposed study (Appendix A). Ads and pamphlets were included in the letter. The letters were followed two or three weeks later by a telephone call. It was assumed that if permission to place the ads was granted over the phone the professional involved would display them. Physicians known through professional contact were visited. The doctors approached were the physicians referring to the several rehabilitation clinics where the researcher worked.

Directors of various rehabilitation clinics in the areas of Toronto, Scarborough,
Mississauga, Markham, and North York were approached to obtain their permission to post ads and to allow small pamphlets in the waiting room of their clinics. The clinic directors were approached by letter (Appendix A) or by telephone and if the first contact was successful, it was followed by a short visit during which signs and pamphlets were distributed.

An approximate total of 120 letters was sent, 250 phone calls were made, 150 signs were posted and 1000 pamphlets were distributed. A special telephone line was established to receive the calls of volunteers. A recorded message encouraged them to leave their phone number and the best time of day or evening to return their calls.

3.1.2 Sample Screening

Prospective participants consisted of male and female adult volunteers who responded to ads placed in the offices of family doctors, rehabilitation clinics, and university campuses and who were screened for inclusion criteria over the telephone. One hundred and seventy-two individuals responded to the ads between March 1995 and January 1996. Of those responding, 111 met all the requirements for inclusion in the study and 101 were available for the interviews. An interview was arranged with each of those volunteers who met the criteria. Participants who did not fulfill the minimum time lapse of six months since the accident were told that they would be contacted at a later date. The rest of the callers were excluded from the sample.

3.1.3 The Sample

One hundred and one individuals who had been involved in a minor MVA were interviewed and completed the measures for this study. The data of one of the participants had
to be discarded as this individual was diagnosed as suffering of Minor Head Injury two months after the testing was completed (participant contacted the researcher to inform this). The final sample consisted of 100 participants.

3.2 Measures

The measures used in this study included four standardized psychometric tests, a screening instrument, and a research questionnaire specifically designed for this research. The final measures were selected, replaced and/or refined after completion of a pilot study with five volunteers who had been involved in minor MVAs. Data from these sources was divided in the following categories: Demographics, measure of personality traits, measures of psychological symptoms after the MVA, assessment of previous life traumas and death threats, assessment of a death threat during the MVA, and assessment of social support and hostility experienced after the MVA.

The NEO Five Factor Inventory (NEO-FFI) was used as a measure of personality traits. The Revised Impact of Event Scale (IES) was used as a measure of avoidance and intrusion symptoms resulting from the motor vehicle accident. The Revised Beck Depression Inventory (BDI) and the Beck Anxiety Inventory (BAI) was used to measure the presence of depressive and anxiety symptoms following the accident. A modified version of the Traumatic Stress Schedule was used to assess the participants' exposure to traumatic events before the MVA and their experience of death threats resulting from the exposure. A question added to the TSS assessed the participants' experience of a threat of death during the MVA. A questionnaire designed for this study was used to assess the experience of hostility and support in the recovery
environment.

3.2.1 Demographic and MVA Information

A questionnaire was constructed to obtain demographic data including the name, gender, age, marital status, ethnic background, education, and occupation of the participants (Appendix C). Situational information related to the MVA was requested as well in the demographic questionnaire. These questions related to the inclusion criteria (i.e., loss of consciousness, hospitalization, litigation and medical attention), the type of MVA, the duration of physical and psychological symptoms, recovery from the MVA, present functioning and the type of household at the time of the MVA.

3.2.2 Measure of Personality Traits

The NEO Five factor Personality Inventory (NEO-FFI) was chosen as the measure of personality traits for the participants in this study. Factors considered in this decision were the availability of an abbreviated version of the instrument, the simplicity of the language as reflected by the requirement of a low grade reading level, the instrument’s focus on traits found in the general population which represent basic dimensions of personality, and its applicability to a multicultural population. The NEO-FFI has been translated into more than 12 languages for research purposes (Costa & McCrae, 1992).

In order to better understand the purpose of the measure, a brief comment on the development of the original instrument and the theory behind its development is appropriate. The NEO-FFI is a 60-item inventory derived from the NEO Personality Inventory (NEO-PI; Costa
& McCrae, 1985). The original NEO-PI was developed as an instrument designed to operationalize a five-factor model of personality. This model of personality was derived from factor analytic research on all the personality trait adjectives which allow individuals to describe themselves and others and provide a good representation of the basic structure of personality (Digman, 1990). Factors are defined by groups of intercorrelated traits. The five factors represent basic dimensions of personality that underlie all the traits identified in both psychological questionnaires and in natural languages. These factors have been named Neuroticism, Extroversion, Openness, Agreeableness and Conscientiousness. Research using the NEO PI has demonstrated that the same five factors can account for the major dimensions in personality inventories and the DSM III-R personality disorders (McCrae & Costa, 1990).

The original NEO PI was replaced by the Revised NEO Personality Inventory (NEO PI-R) which included facet scales intended to tap specific aspects of the five broad factors. Each of the factors is composed by six facet scales. The NEO PI-R scales were developed by a combination of rational and factor analytic methods and have been subject of abundant research on clinical and normal samples.

The NEO PI-R is considered a useful research tool on personality correlates because it provides a comprehensive assessment of the major dimensions of personality. Research making specific hypotheses about the relationships between the NEO PI-R scales and other variables has been conducted successfully, for instance with variables such as moral development (Lonky, Kaus & Rodin, 1984) and response to psychotherapy (Miller, 1991).

Psychometrically, the NEO PI-R has good internal consistency and convergent validity. The internal consistencies for the NEO PI-R domain scales as measured by the Cronbach's alpha
coefficient range from 0.86 to 0.95. Convergent validity is demonstrated by the fact that the NEO PI-R facets -or traits within a domain- are correlated with alternative measures of the same constructs. Costa and McCrae (1992), report positive correlations between The State-Trait Anxiety Inventory (Spielberger, 1983) and the Anxiety facet (a facet of the Neuroticism domain), the Trusting Scale of Interpersonal Style (Lorr, 1986) and the trust facet (a facet of the Agreeableness domain) among others. All six facets of the Neuroticism domain are also reported strongly correlated with the Eysenk Personality Inventory (Eysenk & Eysenk, 1964). All 30 facets are described as having substantial correlations with appropriate criteria (Costa & McCrae, 1992). In addition, several studies cited by Costa and McCrae (1992) demonstrate the construct validity of the NEO PI-R scales with respect to a variety of external criteria, including psychological well-being, coping and defences, needs and motivation, Jungian Types, interpersonal traits and creativity.

Correlations between the original NEO PI and the California Q-Set (Block, 1961) and the Hogan Personality Inventory (Hogan, 1986) support the construct validity of the NEO PI domains and factors; as these two instruments also propose the operationalization of a five-factor model of personality (McCrae & Costa, 1987). Generally, the NEO PI-R is an appropriate instrument for adults of all ages as well as adults of different race (white and non white individuals) and educational levels (grade six and higher).

The measure chosen for this study was the abbreviated 60-item version of the NEO PI-R, the Five Factor Inventory (NEO-FFI) which is a brief, comprehensive measure of the same five domains of personality. The NEO-FFI provides five total domain scores which are close approximations to the personality factor scores. The five domains are as in the NEO PI-R,
Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). A sketch that summarizes an individual's emotional, interpersonal, experiential, attitudinal, and motivational style is obtained from the description of the individual's standing on each of the five factors. Although new norms have been provided for the NEO-FFI, the instrument itself is unchanged. The NEO-FFI consists of five 12-item scales that measure each personality domain. This short form requires only 10 to 15 minutes to complete and as such it can be used when time constraints are important. The NEO-FFI requires only a sixth-grade reading level.

Statistical methods were used in the construction of the NEO-FFI in order to maximize convergent and discriminant validity with the original NEO PI (McCrae & Costa, 1989). The 12 items having the highest positive and negative loading on the corresponding factor were selected. The correlations of the NEO-FFI with the five domain scales of the NEO-PI-R range from 0.92 to 0.77. Internal consistency for the NEO-FFI was calculated using Cronbach's coefficient alpha yielding scores of 0.86 for Neuroticism, 0.77 for Extroversion, 0.73 for Openness, 0.68 for Agreeableness and 0.81 for Conscientiousness. Although these values are smaller than the Cronbach's alpha values for the corresponding scales of the NEO PI-R, all of them are considered acceptable (Costa & McCrae, 1992).

The NEO-FFI scales carry some portion of the demonstrated validity of the full scales of the NEO PI-R. Convergent correlations between the NEO-FFI and the original five factor model range from 0.56 to 0.62. Although the NEO-FFI scales are not equivalent to the full domain scales of the NEO PI-R, on average, they appear to account for about 85% as much variance as in the convergent criteria as do factor scores (Costa & McCrae, 1992).

The five scales of the NEO-FFI measure personality traits (Neuroticism, Extroversion,
Openness, Agreeableness and Conscientiousness), that approximate normal, bell-shaped distributions. In the general population, most individuals will score near the average for the scale with a small percentage at either end. Results are summarized in terms of five levels: very low, low, average, high and very high on each of the scales. No single cut off point separates those individuals who have a trait from those who do not (as in most personality inventories), and a low score on a scale can be as informative as a high score.

The NEO-FFI scale scores are calculated by adding the value of the responses to each of the 12 items of the 5 scales. Values for each item range from 0 to 4 providing a minimum raw score of 0 and a maximum raw score of 48 for each scale. The total score for each scale is then plotted onto a profile form which provides t scores and categories based on adult male and adult female normative samples. Thus, t scores between 65 and 56 are considered high, scores ranging from 55 to 46 are considered average and t scores between 44 and 35 are considered low. T scores over 65 are considered very high and scores below 35 are considered very low. The minimum possible t score for each scale is 25 and the maximum t score is 75.

Participants in this study completed the NEO-FFI and a gender specific t score for Neuroticism, Extroversion, Openness, Agreeableness and Conscientiousness was obtained using the above scoring criteria. The Neuroticism scale score was used in the present study as a measure of vulnerability to stress. Individuals who score high in the N scale are prone to cope more poorly than others with stress (Costa & McRae, 1992). The N scale also includes items describing a general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt and disgust. Although high scoring individuals may be at risk for psychological problems, the N scale is not viewed as a measure of psychopathology (Costa &
3.2.3 Assessment of Psychological Symptoms

Three standardized instruments were used to assess the development of psychological symptoms resulting from the MVA: The revised Impact of Events Scale (Horowitz, Wilner & Alvarez, 1979), the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988) and the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979). Since the focus of the study was on the presence of these symptoms at any point after the accident and as a result of the accident, the measures required some changes in the wording of the items. Therefore, the words “the accident” were added to all the items of the first measure and the present tense was changed into past tense in two of the three symptom measures. In addition it was necessary to include a reminder that stressed that those symptoms had to have been felt as a result of the accident and not as result of situations unrelated to the MVA, eg., a death in the family. All the measures used in the present study are included in Appendix C.

The Revised Impact of Events Scale

The revised Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) is a measure that was designed to provide researchers with a psychometrically-sound self-report instrument to assess the essential characteristics associated with stress disorders (Zilberg, Weiss, & Horowitz, 1982). The IES is a 15-item self-report instrument that measures the experience of post traumatic stress for any specific life event. The instructions intentionally do not define the traumatic event and thus it can be referred to any specific life event. The respondent enters
at the top of the questionnaire the life event that will serve as a referent for each of the 15 items on the scale.

The IES was designed to address the most commonly reported experiences in response to stressful life events, that is, intrusion and avoidance. Intrusion involves the involuntary entry into awareness of ideas, memories, and emotions associated with the event. Avoidance is the conscious attempt to divert attention from cognitions and feelings related to the event (Horowitz, Field & Classen, 1993). These felt experiences of intrusion and avoidance of ideas and feelings related to a stressful life event are two of the four central diagnostic features of Post traumatic Stress Disorder in the DSM IV (American Psychiatric Association, 1994b).

The IES items directly measure the degree of intrusion and avoidance. The 15-item scale contains 7 items on event-related intrusion (e.g. intrusively experienced ideas, images, feelings or dreams) and 8 items on event-related avoidance (consciously recognized avoidance of certain ideas, feelings or situations). The respondent is asked to estimate the frequency to which each item describes his or her experience over the past week on a 4-point scale ranging from "not at all" to "often." A score for each item is obtained by assigning the weights 0, 1, 3, and 5 to the frequency categories (Horowitz, Field & Classen, 1993).

Normative data on the IES was based on samples of outpatients and volunteers who had experienced the death of a parent in the preceding two months. The subscales of the IES show good internal consistency with coefficients ranging from 0.79 to 0.92, with an average of 0.86 for the intrusive subscale and 0.90 for the avoidance subscale. Validity of the IES has been supported with significant differences in the scores between outpatients seeking treatment for bereavement and non patient samples. The IES has been shown to be sensitive to change over
time (Corcoran & Fisher, 1987; Zilberg et al., 1982). Studies indicate that the IES distinguishes between psychotherapy patients and subjects not currently in psychotherapy, with patients reporting significantly higher scores in both intrusion and avoidance responses (Zilberg et al., 1982).

A modified version of the IES was used in this study to measure avoidance and intrusion symptoms resulting from the motor vehicle accident. For greater clarity, the wording of the 15 items was changed to specify the car accident as the event referred to. The change was minimal and involved replacing the word "it" in each of the 15 items for the words "the accident." The IES was administered to assess the presence of these symptoms following an accident that occurred in the past, from six months to three years before the testing date, and necessarily had to represent a retroactive measure of those symptoms. Participants were verbally instructed that the questions refer to any time following the MVA and as a result of the MVA and this specific instruction was added to the first paragraph of the questionnaire (Appendix C).

Subjects rated their reactions to the MVA by indicating the frequency with which they experienced each item after the MVA, and received scores ranging from "not at all" (0), "rarely" (1), "sometimes" (3) and "often" (5). Total scores for each of the two scales, intrusion and avoidance, were obtained by adding the value of item responses. The sum of the two scales scores provided a total score for the inventory. Scores for the avoidance and intrusion scales indicated the presence and frequency of those specific symptoms.

The Beck Depression Inventory

The Beck Depression Inventory (BDI, Beck, et al., 1979) is a self-report measure for
adults consisting of 21 items. Each item presents four alternative statements relating to manifestation of depressive symptoms in adults. The BDI requires between 5 and 10 minutes to complete. The response scores range from 0 to 3 indicating not present, mild, moderate or severe degrees of symptom expression. A total score is obtained by adding the value of all the 21 item responses.

The BDI was originally standardized on a group of psychiatric patients, but has since been applied to a variety of other groups including non clinical groups. The revised BDI has high internal consistency in both clinical and non clinical populations. Reliability estimates based upon Cronbach's coefficient alpha for six normative samples range from 0.79 to 0.90 (Beck & Steer, 1993). These estimates are consistent with mean coefficient alphas reported by Beck, Steer and Garbin (1988) of 0.86 for the BDI meta-analysis with nine psychiatric samples, and of 0.81 for 15 non psychiatric samples. Test-retest correlations of non psychiatric patients range from 0.60 to 0.90 and for psychiatric patients from 0.48 to 0.86 (Beck et al., 1988). In terms of concurrent validity Beck and Steer report that the revised BDI is significantly related to the Depression-Dejection scale in the SCL-90-R (Derogatis, 1977), and to the Depression scale in the Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1983). Beck et al. (1988) found a mean correlation of 0.73 between the Hamilton Psychiatric Rating Scale for Depression (Hamilton, 1960) and the BDI for five psychiatric samples.

Participants in this study were requested to rate their reactions to the MVA by indicating the presence and intensity of depressive symptoms following the accident in a retroactive manner. In order to accomplish this, the instructions given in the text of the BDI to mark the given statements as describing how the person felt "for the past week, including today" were
changed to "as a result of the motor vehicle accident." Subjects were verbally reminded that the statements referred to the time following the MVA and not to the present. In order to ensure that the items were answered in reference to the past and as a result of the MVA each item in this inventory was changed into past tense (Appendix C).

The Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI, Beck, et al., 1988) is a 21-item self report measure that rates the presence and severity of 21 symptoms related to the manifestation of anxiety in adults. The BAI comprises symptoms considered to represent the anxiety experienced in panic, phobia and generalized anxiety disorders that correspond to the symptom criteria presented in the DSM-III-R. The BAI was constructed to measure symptoms of anxiety which are minimally shared with those of depression, such as the symptoms measured by the revised Beck Depression Inventory (Beck & Steer, 1990). Each anxiety symptom is rated on a 4 point scale ranging from 0 to 3. These values were added to obtain the total score for the inventory for each of the participants. The total score is considered to be an estimate of the overall severity of anxiety being described by a person (Beck & Steer, 1990). The response scores indicate not present, mild, moderate or severe degrees of anxiety. A total score is obtained by adding the value of the responses to the 21 items. Reliability estimates of internal consistency based upon Cronbach's coefficient alpha are high for a diagnostically mixed sample of 160 outpatients (alpha = 0.92) as well as for five samples of patients diagnosed as having DSM-III-R anxiety disorders (alpha range from 0.85 to 0.93). Concurrent validity of the BAI has been demonstrated by significant correlations with other self report and clinical rating scales used to measure the severity of
anxiety such as the Hamilton Anxiety Rating Scale-Revised (Hamilton, 1959) and the State-Trait Anxiety Inventory, Form Y (Speilberger, 1983) among others (Beck & Steer, 1990).

Participants in this study were requested to rate their reactions to the MVA by indicating the presence and intensity of anxiety symptoms following the accident in a retroactive fashion. In order to accomplish this, the instructions given in the text of the BAI to mark the given statements as describing if the person experienced any of the symptoms "for the past week, including today" were changed to "as a result of the motor vehicle accident." Subjects were verbally reminded that the statements refer to the time following the MVA and not to the present.

3.2.4 Assessment of Traumatic Events

The Traumatic Stress Schedule (Norris, 1990), is a screening instrument for detecting the occurrence and impact of traumatic events in the general population. Norris (1990) used the definition of a traumatic event provided by the American Psychiatric Association (APA) in the DSM III-R (APA, 1987) diagnostic criteria for PTSD as a starting point for the selection of traumatic events to be included in the schedule. He proposed the following events as a reasonable representation of traumatic events:

1. Loss of a loved one through accident, homicide or suicide,
2. having a motor vehicle accident serious enough to cause injury to one or more passengers,
3. Robbery, a theft involving force or threat of force,
4. Physical assault,
5. Rape,
6. Personal injury or property loss as a result of fire, severe weather, or disaster (natural or technological).

7. Being forced to evacuate or otherwise learning of an imminent hazard in the environment.

These events share common properties in that they are uncontrollable, undesirable, unexpected and relatively rare or outside the realm of normal experience and in accordance with the extraordinary stressor criterion necessary for the diagnosis of PTSD under the DSM-III-R guidelines.

In addition to the seven questions related to the seven selected events, the instrument includes one question (# 8) related to an unspecified event that may have been shocking to the individual. Another question (# 9) relates to more common events such as unemployment and divorce. These last two questions provide room for the phenomenological aspect of trauma, considering the person's experience as an alternative to the stressor's severity as the origin of traumatic reactions (Horowitz, 1983; Breslaw & Davis, 1987).

Each of the nine questions in the TSS includes six probes to assess the variation in the experience of the event. The aspects of the traumatic experience probed include a threat to life and physical integrity, post-traumatic stress symptoms, blame, familiarity, loss, and scope. Only one probe was retained in the questionnaire used in the present study. The probe related to a threat to life during the traumatic experience was included as the experience of a death threat prior to the MVA was among the variables investigated in the MVA population. The last five of these probes were removed from the questionnaire given that symptoms of post-traumatic stress in the present study were examined using the revised Impact of Events Scale and due to the fact that blame, familiarity, loss, scope were not the variables focused on in this study. Question # 9
was removed as it pertains to common life events which do not include the perception of a life threat. A short reminder was added at the end of question # 4 (related to the traumatic experience of a MVA) to clarify to participants that this question referred to a motor vehicle accident previous to the one for which they were being interviewed.

This modified version of The Traumatic Stress Schedule (Appendix C) was administered to the participants in order to assess the frequency of the experience of traumatic events and the perception of life threat resulting from those events, experienced prior to the motor vehicle accident. Participants were asked to indicate, by circling YES or NO, if they ever experienced any of the seven specific traumatic events described in the schedule (Questions # 1 to # 7). They were also asked to indicate if they had experienced any unspecified traumatic event not included in the seven questions (question # 8). Following each of the questions was the probe regarding the perception of a life threat on the event. Total scores were obtained by adding the YES answers and assigning the value 1 to any YES response and 0 to a NO response. Two variables were measured, the experience of a previous traumatic event with values ranging from 0 to 8, and the experience of a previous threat to life with values ranging from 0 to 8.

3.2.5 Assessment of Death Threat at the MVA

In order to assess the participant's experience of a threat to life during the MVA, a question similar to the TSS death threat questions was constructed. The question read: At the time of the collision in the motor vehicle accident, did you feel that your life or the life of anyone in your vehicle was in danger? This question was added to the TSS as a tenth item (Appendix C). Data was expressed categorically in yes/no form.
3.2.6 Assessment of Support and Hostility

A specially designed questionnaire was administered to measure two other aspects of the person's experience of the MVA. This questionnaire assessed the experience of support and hostility received in the environment in which the participant recovered or was recovering from the MVA. Social support was defined as the comfort, assistance and/or information one receives through personal contacts with individuals or groups (Strudler, Whichter, McEvoy, & DeVellis (1983). Hostility was defined as the state of having or expressing enmity or opposition, being antagonistic or unfriendly (Funk & Wagnalls, 1963). The questions tapped into the three most salient environments in rehabilitation, namely the family, the medical environment and the insurance environment (Appendix C).

The Support-Hostility questionnaire was constructed in a 7 point Likert scale reflecting a value range from 1 or "none" to 7 or "extensive" received support and hostility. In this manner, the value of each item ranged from 7 to 1. Each question provided a score from 1 to 7 representing the support received from the family, medical and insurance environment as well as the hostility received from the family, medical and insurance environment. These scores were used to assess the role of support and hostility in the development of psychological symptoms.

3.3 Administration Procedure

Interviews were conducted on an individual basis at the researcher's office at OISE, at the rehabilitation clinics, or in another appropriate place convenient for the participant, usually their home or a library. Interview time ranged from a minimum of 24 minutes to a maximum of two hours and 10 minutes. The time depended on the ability of the participant to answer the
questionnaires and in some cases depended on the participant’s need to talk about the accident and/or about his/her symptoms. All participants were paid $10 for their participation regardless of the time duration of the interview.

At the onset of the interview the participant was asked to participate in the research, was assured of the confidentiality of the information provided and was informed of the right to withdraw from the study at any time. The individual was then presented with the participant consent letter (Appendix B). Once the consent letter was read and signed, the participant was verbally given the demographic questionnaire (Appendix C). During the administration of this questionnaire, after reaching the question referring to the date of the accident, the participant was asked an open question: “do you want to tell me a bit about the accident?” and the researcher took notes of the participant’s description of the event. There was noticeable variation amongst participants in the length and detail of the description of the MVA as well as in the range of emotion displayed when providing it. After this description the remainder of the demographic questionnaire was completed, and at this point the participant was presented with the test package and was given verbal and written instructions to complete the package. To protect the anonymity of the participant he or she was asked not to write his or her name on any of the coded forms.

The test package was composed of the NEO-FFI, the IES, the BAI, the BDI, the Support-Hostility Questionnaire and the TSS (measures are included in Appendix C). All the measures were administered to the participants in identical order. It was decided to begin with the NEO-FFI because its content is general and not related to the MVA. The Traumatic Stress Schedule was administered last so as not to potentially bias the other measures by making trauma
more salient than necessary. Thus, all of the participants were first administered the NEO-FFI, followed by the symptom measures (IES, BAI, BDI) which were presented with clear instructions that the measures were retroactive and related to their behaviour, thoughts and feelings following the MVA, at any point after the MVA and as result of the MVA. The Support-Hostility questionnaire and the Traumatic Stress Schedule which included the question of a death threat during the MVA were presented last. Once the participant was finished, he or she was offered information about the study and answered any questions he or she had about the study or his or her participation. At this point the participant was advised that a summary of the findings of the study would be available upon request to those persons interested.

3.4 Data Analysis

Data were evaluated using the Statistical Package for the Social Sciences (SPSS, 1995) computer program.

Descriptive statistics were used to assess the variability of the intrusion, avoidance anxiety and depression symptoms reported by the MVA sample. Pearson correlations were used to analyze the degree of association between reported symptoms and pre-MVA, MVA, and post-MVA dependent variables as well as to determine the degree of association of the symptoms scales with each other and the dependent variables with each other.

Participants were subsequently classified into three symptom categories: Minimal, Moderate and Severe according to their results in each of the four symptom measures. Four Multivariate Analyses of Variance (MANOVAs) were conducted with the Intrusion, Avoidance, Anxiety and Depression categories of symptom severity as the grouping factor and the pre-
MVA, MVA and post-MVA variables as the dependent variables, in order to study their effect on symptom development among the groups. The significant MANOVAs were followed by Univariate Analyses of variance in order to identify the specific variables related to symptom severity.
CHAPTER 4
RESULTS

The results of this study are organized into two stages of analysis. The goal of the first level of analysis was to describe the sample in detail and to determine the range of psychological symptoms reported by the participants in order to answer the first hypothesis:

Hypothesis 1: Individuals involved in minor MVAs develop a wide range of psychological symptoms ranging from no symptoms to severe symptoms as assessed by the Beck Depression Inventory, the Beck Anxiety Inventory and the Revised Impact of Events Scale.

Once the wide range of symptom variability was established, a second level of analysis was undertaken in order to study the variables considered to have an effect on and to account for the different degrees of psychological symptoms after minor MVAs. These analyses answered the next two hypotheses:

Hypothesis 2: The group of participants developing severe psychological symptoms following a minor MVA will differ from the group with minimal or no symptoms in the intervening variables. The severe symptom group will present: Higher vulnerability to stress (as measured by the neuroticism scale of the NEO-FFI); greater exposure to traumatic events and experiences of death threats (as measured by the TSS) prior to the MVA, greater incidence of a death threat during the MVA and of reactivation of traumatic memories with the MVA (as reported); higher levels of received hostility and lower levels of received support in the recovery environment from family, medical and insurance related environment (as measured by the Support-Hostility Questionnaire).
**Hypothesis 3:** Hostility in the recovery environment will account for more of the psychological symptom variance of the MVA sample than support.

The data analysis describe the sample characteristics, the levels of psychological symptoms reported by the sample, compares symptom characteristics to previously published norms, examines the internal characteristics between symptoms, between intervening variables and between psychological symptoms and intervening variables. This analysis is followed by group analyses of the different symptom severity groups to explore relationships between the participants’ characteristics, their experiences prior to the MVA, at the MVA and recovering from the MVA and the severity of psychological symptoms. The results will be presented in the following order:

1. Description of the participants, the MVAs and the sequelae of the MVAs.
2. Psychological symptoms reported by the participants,
3. Description of the dependent variables: pre-MVA, MVA, and post-MVA reported by the sample.
4. Relationships between the variables: relationships among psychological symptoms, relationships between the dependent variables; and relationships between psychological symptoms and dependent variables.
5. Group analyses: Differences between minimal, moderate and severe symptom groups, regarding the intervening variables.

**4.1 Description of the Sample**

The sample consisted of 100 individuals, sixty-five females and thirty-five males. Sample
age ranged from 18 to 65 years with a mean of 38.0 years and a standard deviation of 12.02. The median age of the sample was 39. Twenty six percent of the participants were under the age of 29. 28% were between 30 and 39 years, 27% of the participants were in their forties and the remainder 19% were between 50 and 65 years old. The majority (56%) of the individuals were married. Nine percent of the sample were in a category called “other”, which included separated, common law and widowed participants. Sixteen percent of the participants lived without another adult in the household and 54% had one or more children under age 18 in the home at the time of the accident. The level of education of the sample ranged from no formal education to completed postgraduate studies. The largest group of participants had completed at least secondary education (39%), and high proportion (43%) of participants had completed some type of post-secondary education. Of note is the 2 individuals, both female, both immigrants who had no formal education. A detailed break-down of the participant’s level of education is presented in Table 1.

In terms of ethnicity, the sample consisted of 38% Canadian born participants and 62% immigrants from various countries in South and Central America, Europe, Africa and Asia. Thirty one percent of the participants were from countries of Latin America including Argentina, Colombia, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Uruguay, and Peru. Eighteen percent of the sample was born in countries of Europe including England, Greece, Italy, Poland, Portugal, Scotland, and Spain. The remainder of the sample, 13%, was born in countries of Africa and Asia including Bangladesh, China, Hong Kong, India, Nigeria, Phillippines, Sudan, Taiwan and Yemen. Table 1 describes the ethnicity of the foreign born participants by continent of origin.
Table 1. Demographic Information of Sample of 100 MVA Victims

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4.1.1 Motor Vehicle Accidents

As previously mentioned, the MVA was qualified as minor if it resulted in minor personal injury (no hospitalization or loss of consciousness). The definition of a motor vehicle accident for this study did not necessarily require two vehicles in a collision. In this way other types of
MVAs involving only one motor vehicle were included. Accident type was divided into four categories: rear end collision, front end collision and side collision. A fourth accident category called “other” included double impacts, pedestrian-motor vehicle, bicycle-motor vehicle, motor vehicle colliding with a light pole, motor vehicle colliding with a public transit platform and a derailment of a Toronto Transit Commission streetcar. Rear end collisions were the most common (38%) and accidents in the “other” category consisted of only 8% of the sample. Twenty nine percent of the sample was involved in front end collisions and 25% of the participants' group had experienced side impact collisions. All the accidents in the sample occurred between 1992 and 1995 with the highest proportion occurring in 1994 (58%) and the lowest proportion in 1995 (9%). Eleven percent of the sample reported accidents in 1992 and 22% reported accidents in 1993.

4.1.2 Sequelae of the MVAs

A detailed description of injury related information of the sample is reported in Table 2. As the sample was selected attempting to exclude individuals who may have suffered concussion or traumatic brain injury in the accident, those who had lost consciousness in the MVA were not included. However, individuals who had not lost consciousness but reported having suffered a blow to the head in the accident were included in the study. This group constituted 34% of the total sample. Four percent of the participants did not remember or could not say whether they had hit their heads during the collision.

In terms of the medical condition following the accident, only 3% of the participants reported having suffered no physical injury although they had consulted a physician, and only 9%
consulted a family physician but did not receive any form of physical treatment as a result of the MVA. The remainder of the sample reported suffering injuries that required receiving some form of physical treatment such as physiotherapy, acupuncture or chiropractic treatment. The range of duration of the reported physical symptoms varied from 1 to 36 months and many participants were still in treatment at the time of the interview. The most frequent response to the question related to duration of physical symptoms was “until now” (the interview). Only 23% of the participants reported being fully recovered at the time of the interview. One participant reported feeling well while he was being interviewed but not being sure that he was fully recovered.

The experience of psychological symptoms resulting from the MVA was reported by 69% of the sample. The duration of the symptoms varied from one month to thirty months following the accident. As with the reported physical symptoms, many individuals reported still experiencing psychological symptoms at the time of the interview. Fifty percent of the participants had received psychological treatment for psychological symptoms resulting from the MVA. Thirty one percent of the participants reported not having experienced psychological symptoms as result of the MVA. An additional 14% reported experiencing psychological symptoms for a period of 5 months or less. Since participants were interviewed 6 months after the MVA, this group was free of psychological symptoms at the time of the interview. In terms of functioning, the majority of the participants (86 %) reported that they missed work and/or school activities as result of the MVA.
Table 2. Accident Sequelae Reported by 100 MVA Victims

<table>
<thead>
<tr>
<th>Participant's Report</th>
<th>% Yes</th>
<th>% No</th>
<th>% Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hit head at MVA</td>
<td>34</td>
<td>62</td>
<td>4</td>
</tr>
<tr>
<td>Physical symptoms</td>
<td>97</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Physical treatment</td>
<td>91</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Full recovery</td>
<td>23</td>
<td>76</td>
<td>1</td>
</tr>
<tr>
<td>Psychological symptoms</td>
<td>69</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Psychological treatment</td>
<td>50</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Missed work/school</td>
<td>86</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</table>

4.2 Psychological Symptoms

Psychological symptoms resulting from the MVAs were measured using 3 instruments: The Beck Depression Inventory (BDI, Beck et al., 1979), the Beck Anxiety Inventory (BAI, Beck, et al., 1988) and the revised Impact of Events Scale (IES, Horowitz, et al., 1979). These measures provided 4 clusters of symptoms: depressive symptoms (BDI), anxiety symptoms (BAI), intrusive symptoms (Intrusion scale, IES), and avoidance symptoms (Avoidance scale, IES). For the purposes of this study it was decided to use the two scales separately in order to assess the quality of the symptoms independently as suggested by Zielberg, et al. (1982) in their validation studies of the IES. This recommendation is based in the fact that the two scales measure symptoms commonly encountered in reactions to stressful events but of a different type. The combined scores of Intrusion and Avoidance yield a total IES score representing the level
of psychological distress

4.2.1 Depressive Symptoms

A total of 100 participants completed the revised Beck Depression Inventory (BDI). Each of the item scores (range 0-3) were added to yield a total score for the inventory with a minimum possible total low score of 0 and a maximum total high score of 63 for the 21 items that comprise the inventory. The mean score of all the participants on this instrument was 20.10 with a standard deviation of 13.16, a minimum score of 0 and a maximum of 51. The total score of each participant was subsequently categorized according to the recommended guidelines of the most recent edition of the revised Beck Depression Inventory Manual (Beck & Steer, 1993) yielding 4 categories: "Minimal", "Mild", "Moderate" and "Severe". Of the hundred participants in this study 27 were in the minimal category, 18 were in the mild category, 30 were in moderate category and 25 were in the severe range (see table 3). As can be seen, participants developed symptoms commonly associated with depression ranging from minimal to severe as predicted in hypothesis 1. Twenty five percent of the participants reported depressive symptoms in the severe range as a result of a minor MVA.
Table 3. Depression and Anxiety Scores Reported by 100 MVA Victims

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Category</th>
<th>Score Range</th>
<th>Frequency (f)</th>
<th>Cumulative f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Minimal</td>
<td>0-9</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>BDI mean=20.10</td>
<td>Mild</td>
<td>10-16</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>SD=13.16</td>
<td>Moderate</td>
<td>17-29</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>30-63</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Normal</td>
<td>0-9</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>BAI mean=27.67</td>
<td>Mild-moderate</td>
<td>10-18</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>SD=14.84</td>
<td>Moderate-severe</td>
<td>19-29</td>
<td>22</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>30-63</td>
<td>47</td>
<td>100</td>
</tr>
</tbody>
</table>

4.2.2 Anxiety Symptoms

The anxiety symptoms reported by the 100 participants on the BAI are described in Table 3. The BAI has a minimum possible score of 0 and a maximum possible score of 63. The mean total score for the 100 participants on the BAI was 27.67 with a standard deviation of 14.84, a minimum score of 0 and a maximum score of 56. Each of the participant’s total scores was subsequently classified in terms of the severity of anxiety symptoms into the categories suggested in the Beck Anxiety Inventory manual (Beck & Steer, 1990). Four categories of anxiety were obtained: “normal”, “mild-moderate”, “moderate-severe”, and “severe”. Thirteen percent of the 100 participants were in the normal category, 18% were in the mild-moderate category, 22% in the moderate-severe range, and 47% of the sample was in the severe range of anxiety symptoms. The table clearly describes that this sample of individuals involved in a minor MVA developed
anxiety symptoms ranging from normal to severe as predicted in hypothesis 1. Of note is the high proportion of participants, almost half (47%) of the sample, reporting anxiety in the severe range.

4.2.3 Intrusion and Avoidance Symptoms

The scores of the 100 participants who completed the Revised Impact of Event Scale (IES) were computed separately for the Intrusion and Avoidance scale.

Seven of the 15 items of the IES are related to intrusive symptoms. The 7 items of the Intrusion scale were added to yield a total score for intrusive symptoms for each participant. The total minimum possible score for the Intrusion scale was 0 and the maximum possible score was 35. The mean score for the total sample of minor MVA victims on the Intrusion scale was 20.05 with a standard deviation of 9.51, with a minimum score of 0 and a maximum score of 35.

In order to assess the magnitude of the symptoms reported by the entire MVA sample, the intrusion mean score of the MVA sample ($M = 20.05$) was compared with the mean score ($M = 21.4$) of the normalization sample of patients who had suffered accidents, illness, injury and bereavement reported by Horowitz, et al. (1979), and was also compared to the mean score ($M = 4.0$) of the non-patient sample the same study (as reported by Horowitz et al, 1993). A $t$ test comparing the group means was computed. Results indicated that the mean score of the MVA sample was not significantly different from the patient normalization sample ($t(99) = -1.42, p < 0.15$) and was significantly different from the non-patient sample ($t(99) = 16.88, p < 0.001$).

Further comparison of the mean intrusion score of the MVA sample was carried out using $t$ tests. This time the two comparison groups were a sample of patients who sought
treatment after the death of a parent and a sample of field subject volunteers as reported in a validation study of the IES (Zielberg et al., 1982). The reported sample mean of the bereaved volunteers group in the intrusion scale was \( M = 13.5, \ SD = 9.1 \) and the patient sample mean was \( M = 21.2, \ SD = 7.9 \). Results indicate that the MVA sample mean for intrusion (\( M = 20.05 \)) was significantly different from the bereaved volunteers mean (\( t (99) = 6.89, \ p < 0.001 \)) and not significantly different from the patient sample.

These comparisons indicate that the mean score for intrusion symptoms of the MVA sample is similar to the means of two samples of patients who were experiencing psychological distress after a stressful event and sought psychological treatment for their problems. The fact the MVA mean score for intrusion is comparable to the patient sample suggest the presence of high individual scores in the MVA sample indicating high or severe intrusion symptomatology.

The scores of each of the 8 items of the Avoidance scale were added yielding a total score for avoidance symptoms. The minimum possible total score on the Avoidance scale was 0 and the maximum possible total score was 40. The mean score for avoidance for the sample of MVA participants was \( M = 16.98 \) with a standard deviation \( SD = 10.09 \). a minimum score of 0 and a maximum score of 38.

In order to determine if the mean avoidance score (\( M = 16.98 \)) of the MVA sample was normal or comparable to the mean of a stressed sample population, the MVA sample mean was compared with the mean score (\( M = 18.2 \)) of the normalization sample of patients who sought treatment for stress and who had experienced bereavement, accidents, violence, illness or injury (Horowitz, et al., 1979). A \( t \) test revealed the avoidance mean score of this sample of MVA victims was not significantly different from the mean of the patient normalization sample.
The mean avoidance score of the MVA sample was also compared with the mean avoidance score \((M = 6.0, \text{ as reported by Horowitz et al., 1993})\) of the non-patient/student sample of the normalization group by a \(t\) test. These results indicate that the MVA sample mean was significantly different from the non-patient sample \((t(99) = 10.88, p < 0.001)\).

As with the intrusion mean score, the avoidance mean score of the MVA sample was subjected to further comparison with the patient and field subject samples of the validation studies reported by Zielberg et al., (1982). Results of \(t\) tests revealed that the avoidance mean of the MVA was significantly different from the patient sample \((t(99) = -3.73, p < 0.05)\) and also significantly different from the volunteer sample \((t(99) = 7.5, p < 0.05)\). Details of these comparisons are outlined in table 4.
Table 4. Comparison of IES Means of MVA Sample with Published Data

<table>
<thead>
<tr>
<th>Comparison sample</th>
<th>MVA mean</th>
<th>Norm mean</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normalization study: Horowitz, et al., 1979</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Compared to trauma clinic patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrusion</td>
<td>20.05</td>
<td>21.4</td>
<td>-1.42</td>
</tr>
<tr>
<td>Avoidance</td>
<td>16.98</td>
<td>18.2</td>
<td>-1.21</td>
</tr>
<tr>
<td>2. Compared to students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrusion</td>
<td>20.05</td>
<td>4.0</td>
<td>16.88 (d)</td>
</tr>
<tr>
<td>Avoidance</td>
<td>16.98</td>
<td>6.0</td>
<td>10.88 (d)</td>
</tr>
<tr>
<td><strong>Validation study: Zielberg, et al., 1982</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Compared to bereaved clinic patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrusion</td>
<td>20.05</td>
<td>21.2</td>
<td>-1.21</td>
</tr>
<tr>
<td>Avoidance</td>
<td>16.98</td>
<td>20.8</td>
<td>-3.79 (a)</td>
</tr>
<tr>
<td>2. Compared to bereaved volunteers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrusion</td>
<td>20.05</td>
<td>13.5</td>
<td>6.89 (d)</td>
</tr>
<tr>
<td>Avoidance</td>
<td>16.98</td>
<td>9.4</td>
<td>7.51 (a)</td>
</tr>
</tbody>
</table>

a) \(p<0.05\)  b) \(p<0.01\)  c) \(p<0.005\)  d) \(p<0.001\)

In conjunction, these results indicate that the intrusion and avoidance scores of the MVA sample are significantly different from the scores of 2 samples of individuals who have experienced a stressful event without developing intrusion and avoidance symptoms. These results, with one exception, also indicate that the MVA sample scores are similar to populations of patients which were experiencing distress after a stressful event. We can reasonably assume based on these findings that the variance of scores of the MVA sample reflects a wide range of scores including minimal or no symptoms, moderate symptoms and severe symptoms.
The IES scores have not been classified according to severity categories as in the previously described symptom measures, the BDI and The BAI. Therefore, the results of IES for the MVA sample will be presented in Table 5 as a frequency distribution with arbitrary limits to best illustrate the fact that the intrusive and avoidance symptoms of the sample are spread from very low scores to very high scores as predicted in hypothesis 1.

| Table 5. IES Score Distribution for Sample of 100 MVA victims |
|------------------|------------------|
| **Score Range**  | **Frequency and %** |
| Intrusion Scale  |                  |
| 0-9              | 14               |
| 10-19            | 35               |
| 20-29            | 31               |
| 30-35            | 20               |
| Avoidance Scale  |                  |
| 0-9              | 30               |
| 10-19            | 24               |
| 20-29            | 34               |
| 30-40            | 12               |

4.3 Intervening Variables

The variables hypothesized to have relevance in the development of psychological symptoms were classified into pre-MVA variables, MVA variables and post-MVA variables. The pre-MVA variables included vulnerability to stress (neuroticism scale of the NEO-FFI) and the individual's exposure to traumatic experiences and to experiences of death threat prior to the MVA (modified TSS). The MVA variables included the participants perception of death threat.
during the MVA (self report), and the reactivation of previous traumatic experiences by the MVA (self report). The post-MVA variables studied were the support and hostility received by the MVA victim in the recovery environment (Support-Hostility questionnaire). The received hostility and received support variable were each composed of 3 categories: family related, medical related and insurance related.

4.3.1. Pre-MVA variables

1. Vulnerability to Stress (tNeuro): The Neuroticism Scale (N) of the NEO-FFI, like the other 4 scales of the instrument, measures a dimension of normal personality namely the susceptibility to psychological distress. The N scale include items describing a general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt and disgust. Individuals who score high in the N scale are also prone to cope more poorly than others with stress. Although high scoring individuals may be at risk for psychological problems the N scale is not viewed as a measure of psychopathology (Costa & McRae, 1992).

The MVA sample raw scores were converted into t scores to equalize the different scores produced by the separate male and female norms and were used in the analysis. The minimum possible t score was 25 and the maximum possible t score was 75. The mean t score obtained for the entire sample was 53.84 with a standard deviation of 10.89. By plotting the t scores onto a graphic chart it is possible to obtain 5 different categories for the neuroticism scores. Table 6 describes the frequencies for each of the 5 categories of the N scale. The categories are depicted only for illustration purposes. Individual t scores were used in all the statistical analyses.
Table 6. NEO-FFI Neuroticism Scores Reported by 100 MVA Victims

<table>
<thead>
<tr>
<th>Neuroticism category</th>
<th>t score range</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>very low</td>
<td>25-34</td>
<td>3</td>
</tr>
<tr>
<td>low</td>
<td>35-44</td>
<td>17</td>
</tr>
<tr>
<td>average</td>
<td>45-55</td>
<td>34</td>
</tr>
<tr>
<td>high</td>
<td>56-65</td>
<td>33</td>
</tr>
<tr>
<td>very high</td>
<td>66-75</td>
<td>13</td>
</tr>
</tbody>
</table>

2. Previous Traumatic Events (TSStra): The exposure to previous traumatic events was assessed by the modified version of the Traumatic Stress Schedule. The TSS included 7 questions related to 7 specific traumatic events and 1 question related to an unspecified traumatic event. The specific traumatic events included: 1. loosing of an object by force or threat to force, 2. being attacked by another person, 3. being forced to unwanted sexual activity, 4. Having been in a severe MVA, 5. Loosing a loved one due to accident, homicide or suicide, 6. Having suffered injury due to natural or manmade disaster, 7. Having experienced imminent hazard in one's environment. The participants responded to a yes/no format. The affirmative responses were assigned a value of 1 and the negative responses were assigned a value of 0. All of the yes responses were added to obtain the total number of traumatic events each participant had been exposed to, prior to the MVA.

Results indicate that 80% of the sample of MVA victims had experienced one or more traumatic events prior to the MVA and that 36% had been involved in a previous motor vehicle accident. Twenty seven percent experienced physical assault, 21% sexual assault, 20% disaster,
17% tragic death of a loved one, 15% robbery and 12% environmental hazard.

3. Previous Death Threats (TSSdeath): The experience of death threat prior to the MVA was assessed by the question: “If yes, did you ever feel that your life was in danger during the incident” which followed each of the questions regarding traumatic events in the modified version of the TSS. There were 8 such questions to be answered, only if the participant had experienced the specific traumatic event, in a Yes/No format. Each “yes” answer was assigned the value of 1 and each “no” answer was assigned the value of 0. Thus, the minimum value for death threat experiences was 0 and the maximum value was 8.

Forty five percent of the sample reported no previous experience of death threat. The remainder of the participants reported having experienced 1, 2, 3 or 5 experiences of death threat prior to the MVA (see Table 7).
Table 7. Traumatic Events and Death Threats Reported by 100 MVA Victims

<table>
<thead>
<tr>
<th>Experience</th>
<th>N Reported</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traumatic events</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>prior to MVA</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Death threats</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>prior to MVA</td>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

4.3.2 MVA Variables

1. **Death Threat at MVA** (dthMVA): The participant’s perception of a threat of death during the collision was assessed by a question added to the Traumatic Stress Schedule. The question read: At the time of the collision in the motor vehicle accident, did you think that your life or the life of anyone in your vehicle was in danger? Participants answered in a yes/no format to the question. Each “yes” response was assigned a value of 1 and each “no” response was
given a value of 0. More than 50% of the participants indicated that they had experienced a death threat during the MVA (see table 8). The mean sample value for this variable was 0.56.

2. Reactivation of Traumatic Memories (React): Reactivation of traumatic memories was defined as painful memories about any of the traumatic events described in TSS brought back to consciousness as a result of the MVA. Reactivation of traumatic memories was assessed by the question: “Has the motor vehicle accident in anyway brought back painful memories of any of those experiences? If yes, which one/s (just give the number/s)”. This question was located immediately after the 8 questions related to the traumatic events experienced in the past and obviously did not apply to the participants who had not experienced any traumatic event before the MVA. The eighty participants who had experienced traumatic events answered to this question in a Yes/No format. “Yes” responses were given a value of 1 and “no” responses were assigned a value of 0. Results are detailed in table 8. The frequency of reactivation of the different types of trauma is also presented in table 8. The type of trauma most frequently reactivated was previous MVA followed by “other” and sexual assault.
### Table 8. MVA Death Threat, Memory Reactivation and Type of Reactivation Reported by MVA Victims

<table>
<thead>
<tr>
<th>MVA Variable</th>
<th>Response</th>
<th>Frequency and %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death Threat at MVA</td>
<td>yes</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>56</td>
</tr>
<tr>
<td>Memories Reactivation</td>
<td>yes</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>no trauma</td>
<td>20</td>
</tr>
<tr>
<td>Memories Reactivated</td>
<td>Robbery</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Physical assault</td>
<td>6 e</td>
</tr>
<tr>
<td></td>
<td>Sexual Assault</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Previous MVA</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Tragic Death</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Disaster</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>8</td>
</tr>
</tbody>
</table>

### 4.3.3 Post-MVA Variables

**Support and hostility** (SupFam, SupMed, SupIns, HostFam, HostMed, HostIns): The extent of support and hostility received from the recovery environment was assessed by a set of 6 questions which composed the Support-Hostility questionnaire (Appendix C). The first 3 questions related to received support and the last 3 items related to received hostility. The question stated: During the period following the accident, recovery period, did you receive any social support (for the first 3 items) -any hostility (for the last 3 items)- from: a) your family
environment, b) your medical environment, c) your insurance environment. Each of these questions was answered in a Likert-type scale ranging from a value of 1 (none) to a value of 7 (extensive). The minimum possible value for each response was 1 and the maximum possible score was 7.

One hundred participants answered the questionnaire. Ninety nine participants answered all six questions. One participant did not give an answer to the questions regarding support and hostility from the medical environment because he was medically treated by a family member. The same participant could not answer the question regarding support and hostility from the insurance environment. This was explained by the lack of contact with the insurer as the participant did not report the accident to the insurer. Thus, some computations were based on sample size $N = 99$. The results for the participants who responded to the Support-Hostility questionnaire are summarized in table # 9. The minimum value endorsed by the participants for all 6 items was 1 and the maximum value for all items except Family hostility was 7. The maximum value for family hostility for the MVA sample was 6. Table # 9 describes the means for the perceived support and hostility in the different recovery environments.
Table # 9  Support and Hostility Reported by 100 MVA Victims

<table>
<thead>
<tr>
<th></th>
<th>Environment</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Support</strong></td>
<td>Family</td>
<td>5.20</td>
<td>1.74</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
<td>5.67*</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>Insurance</td>
<td>3.57*</td>
<td>2.01</td>
</tr>
<tr>
<td><strong>Hostility</strong></td>
<td>Family</td>
<td>2.18</td>
<td>1.62</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
<td>2.03*</td>
<td>1.71</td>
</tr>
<tr>
<td></td>
<td>Insurance</td>
<td>3.84*</td>
<td>2.19</td>
</tr>
</tbody>
</table>

* N=99 1 case missing data

4.4 Relationships Among Variables

4.4.1. Relationships Among Symptom Measures.

Pearson correlation coefficients among the four dependent variables scores, the IES intrusion scores, the IES avoidance scale scores, the BAI scores and the BDI scores revealed significant correlations among the four symptom clusters for the MVA sample. Table 10 summarizes these relationships.

Table 10. Pearson Correlation Coefficients Among Symptom Measures

<table>
<thead>
<tr>
<th></th>
<th>IES intrusion</th>
<th>IES avoidance</th>
<th>BAI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IES avoidance</strong></td>
<td>0.57&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>BAI</strong></td>
<td>0.56&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.55&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td><strong>BDI</strong></td>
<td>0.66&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.54&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.74&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>d</sup> p <0.001
As it can be seen in table 10 all the symptoms were highly and significantly correlated at the $p < 0.001$ level indicating that the participants who experienced a high level of psychological symptoms of one kind, also developed high levels of psychological symptoms of the other varieties measured. Likewise, those participants who reported low symptoms in one measure were more likely to report lower symptoms in the other measures.

4.4.2. Relationships Among Intervening Variables

The relationships among predictors were analyzed by Pearson correlation coefficients and the results are presented in table 11.

Of the pre-MVA factors, the only significant relationship was found between the experience of traumatic events and the experience of threat of death before the MVA. This relationship may have been enhanced by the fact that as the experience of a threat of death was dependent on the experience of a traumatic event which was reported by 80% of the sample. No significant relationship was found between these experiences and the neuroticism scores. Neuroticism scores were related only to post MVA factors where a positive relationships was found with received hostility from the insurance environment. The relationship among neuroticism scores and the family environment was positive and negative as it related positively to received family hostility and negatively to received family support.

No significant relationship was found among the MVA factors, namely the experience of death threat during the MVA and the reactivation of previous trauma. Death threat at the MVA was negatively related to one pre-MVA factor, the experience of traumatic events and positively related to one post-MVA factor, the degree of family hostility received in the recovery
environment.

Reactivation of previous traumatic memories was strongly correlated to the experience of traumatic events and death threats previous to the MVA. Reactivation of traumatic memories was reported by 24% of the sample and only applied to the 80% of the sample participants who had experienced one or more traumatic events.

Two of the three post-MVA factors related to support in the recovery environment were significantly related among each other, support from the family and support from the medical environment indicating that individuals who receive higher levels of support from the family also receive significant support from the medical environment but not necessarily from the insurance environment. Measures of received hostility in the different recovery environments were correlated among each other. Family hostility was highly correlated to medical hostility and significantly correlated to insurance hostility. People who received high levels of hostility from the family also received hostility from the medical and from the insurance environment. Hostility from the family, from the medical and from the insurance environments were all significantly correlated in a negative direction with their equivalent support measure. Individuals who received higher levels of hostility in any one of the 3 recovery environments were more likely to receive lower levels of support from the same environment. This relationship was significantly stronger for the insurance environment and may reflect the overall lower mean values of support and the higher values of hostility from the insurance environment in comparison to the other environments that were reported by the sample (see table 9). Table 11 presents the Pearson correlation values for the relationships between intervening variables.
Table 11. Pearson Correlation Coefficients Between Intervening Variables

<table>
<thead>
<tr>
<th></th>
<th>TSS neu</th>
<th>TSS trau</th>
<th>TSS dth</th>
<th>Dth</th>
<th>React</th>
<th>Supp Fam</th>
<th>Supp Med</th>
<th>Supp Ins</th>
<th>Host Fam</th>
<th>Host Med</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS neu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS trau</td>
<td>-0.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS dth</td>
<td>-0.01</td>
<td>0.65d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dth MVA</td>
<td>0.06</td>
<td>-0.21a</td>
<td>-0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>React</td>
<td>-0.04</td>
<td>0.29c</td>
<td>0.30c</td>
<td>-0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supp Fam</td>
<td>-0.23a</td>
<td>0.11</td>
<td>0.01</td>
<td>0.05</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supp Med</td>
<td>-0.12</td>
<td>-0.02</td>
<td>-0.08</td>
<td>-0.09</td>
<td>0.14</td>
<td>0.38d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supp Ins</td>
<td>-0.15</td>
<td>-0.09</td>
<td>-0.11</td>
<td>-0.01</td>
<td>-0.12</td>
<td>0.15</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host Fam</td>
<td>0.28b</td>
<td>-0.12</td>
<td>-0.08</td>
<td>0.33c</td>
<td>0.06</td>
<td>-0.23a</td>
<td>-0.21a</td>
<td>-0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host Med</td>
<td>0.14</td>
<td>0.03</td>
<td>0.02</td>
<td>0.18</td>
<td>0.07</td>
<td>-0.23a</td>
<td>-0.22a</td>
<td>0.01</td>
<td>0.50d</td>
<td></td>
</tr>
<tr>
<td>Host Ins</td>
<td>0.25a</td>
<td>-0.12</td>
<td>-0.15</td>
<td>0.08</td>
<td>0.04</td>
<td>-0.07</td>
<td>0.02</td>
<td>-0.56d</td>
<td>0.27b</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Note. Correlations are based on sample sizes that vary from 99 to 100
a) p<0.05; b) p<0.01; c) p<0.005; d) p<0.001

4.4.3 Relationships Among Variables and Symptoms

Pearson correlation coefficients were used to analyze the degree of association between the intervening variables and the psychological symptoms measured by the IES, BAI and BDI.

These associations are described in table 12.
Significant associations were found between some of the pre-MVA factors and the symptom measures. The t scores of the Neuroticism scale of the NEO Five factor Personality Inventory were significantly correlated with the symptoms of anxiety reported by the participants in the BAI ($t = 0.29, p < 0.005$), and also significantly correlated with the depressive symptoms measured by the BDI ($t = 0.35, p < 0.001$). The experience of previous traumatic events as measured by the TSStra factor was not significantly associated to the symptom measures. However, the experience of previous death threat was significantly correlated with the avoidance symptoms measured by the avoidance scale of the IES ($t = 0.29, p < 0.005$). This result suggests that the experience of any one traumatic event, without the experience of death threat during the event may not be sufficient to account for its relationship with avoidance symptoms.

Several significant associations were found between symptom measures and the MVA factors: the experience of a threat of death at the MVA and the reactivation of previous traumatic memories. The most significant finding is the strong association of the MVA death threat with all the symptom measures. The threat of death at the MVA was significantly correlated with symptoms of intrusion ($t = 0.30, p < 0.005$), with symptoms of avoidance ($t = 0.20, p < 0.05$), with symptoms of anxiety ($t = 0.37, p < 0.001$), and with symptoms of depression ($t = 0.27, p < 0.01$). The reactivation of previous traumatic memories was significantly correlated with symptoms of avoidance ($t = 0.34, p < 0.001$) and with symptoms of anxiety ($t = 0.26, p < 0.01$).

Significant relationships were also found between the post-MVA factors and the symptom measures. These significant relationships were found in the participants reports of received hostility in their recovery environment, the most notable the received hostility in the
family environment which was correlated significantly with all the symptom measures. Family hostility was correlated with intrusion symptoms ($r = 0.34$, $p < 0.005$), with avoidance symptoms ($r = 0.25$, $p < 0.05$), with symptoms of anxiety ($r = 0.26$, $p < 0.01$) and with symptoms of depression ($r = 0.45$, $p < 0.001$).

Hostility received from the medical environment was also related to all psychological symptom measures with the exception of the intrusive symptoms. Hostility in the medical environment was significantly correlated with avoidance symptoms ($r = 0.27$, $p < 0.01$), with anxiety symptoms ($r = 0.26$, $p < 0.05$) and with depressive symptoms ($r = 0.33$, $p < 0.005$). Hostility received from the insurance environment, although a higher hostility mean than family and medical hostility, was only related to the depressive symptoms ($r = 0.25$, $p < 0.05$). This indicates that although on the average, individuals received more hostility from the insurance environment, the received hostility did not relate to psychological symptoms in a linear fashion.
Table 12. Pearson Correlation Coefficients Between Intervening Variables and Symptom Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>IES Intrusion</th>
<th>IES Avoidance</th>
<th>BAI</th>
<th>BDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerability to Stress</td>
<td>0.10</td>
<td>0.06</td>
<td>0.29&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.35&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Previous Trauma Events</td>
<td>-0.01</td>
<td>0.10</td>
<td>-0.02</td>
<td>-0.12</td>
</tr>
<tr>
<td>Previous Death Threats</td>
<td>0.00</td>
<td>0.29&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>MVA Death Threat</td>
<td>0.30&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.37&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.27&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Reactivation of Memories</td>
<td>0.16</td>
<td>0.34&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.26&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.18</td>
</tr>
<tr>
<td>Support Family</td>
<td>0.01</td>
<td>-0.08</td>
<td>0.13</td>
<td>-0.09</td>
</tr>
<tr>
<td>Support Medical</td>
<td>0.14</td>
<td>0.04</td>
<td>0.16</td>
<td>0.07</td>
</tr>
<tr>
<td>Support Insurance</td>
<td>0.04</td>
<td>0.02</td>
<td>0.05</td>
<td>-0.10</td>
</tr>
<tr>
<td>Hostility Family</td>
<td>0.34&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.26&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.45&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hostility Medical</td>
<td>0.15</td>
<td>0.27&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.26&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.33&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hostility Insurance</td>
<td>0.17</td>
<td>0.11</td>
<td>0.08</td>
<td>0.25&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

a) p<0.05;  b) p<0.01;  c) p<0.005;  d) p<0.001

The descriptive data analysis above demonstrated that individuals involved in minor car accidents develop a wide range of psychological symptoms—from minimal or normal to severe—in the four symptom categories measured in the study, thus answering Hypothesis 1. The
also described the variables in detail and illustrated the patterns of relationships among the symptom variables and the pre-MVA, MVA and post-MVA variables of interest in this study.

The next level of analyses will focus on the different groups of symptom severity and on the variables of interest in the present study which may explain the differences in symptom severity.

4.5 Group Analyses

The main focus of this study was to identify and measure intervening variables which may explain the marked variability of symptom development in minor MVA victim population. In particular, to identify variables which may account for the differences in symptom development between the individuals who report severe levels of depression, anxiety, intrusion, and avoidance and those who develop moderate or minimal levels. In order to address this question, four one-way multivariate analyses of variance (MANOVAs) were conducted with the MVA sample; one MANOVA for each symptom type. In each analysis the sample was divided in 3 groups according to level of symptom severity. The groups were named: “minimal”, “moderate” and “severe”. The formation of the 3 groups was accomplished in different manner for the different measures; for the BDI and the BAI the division was based on previously published norms and for two scales of the IES the division was based on percentile partition of the sample.

To obtain three groups of symptom severity from the four categories provided by the test authors for the BDI (Beck & Steer, 1993) and for the BAI (Beck & Steer, 1990), the two middle categories were combined. Therefore, for the BDI scores from 0 to 9 were minimal, from 10 to 29 were considered moderate and from 30 to 63 were called severe. The scores for the BAI
were categorized as follows: from 0 to 9 minimal, from 10 to 29 moderate and from 30 to 63 severe.

The IES does not provide categories for symptom severity. Significant post-traumatic stress has been defined as a total IES score of 30 or greater (McFarlane, 1988). Other studies have compared the sample means on the individual scales with the means of the normalization or validation samples. The latter criteria was chosen for this study and the comparisons (see table #4) indicated that the intrusion and avoidance means of the MVA sample were significantly different from non-clinical samples and similar to clinical samples. Therefore, it was reasonable to assume that the MVA sample contained a severe symptom group in the top third percentile.

Three different symptom severity groups were obtained by dividing the MVA sample avoidance and intrusion scores using the 33.3 percentile as a cut off score. Thus, for the Intrusion scale, scores from 0 to 15 were considered minimal, 16 to 25 were moderate and 26 to the highest score were in the severe category. For the IES Avoidance scale the categories were organized as follows: scores from 0 to 10 were called minimal, from 11 to 23 were classified as moderate and from 24 to the highest score were considered severe. These partition limits may be considered conservative for the severe symptom group if the severe ranges for intrusion (26 to 35) and for avoidance (24 to 40) are compared to the IES mean scores (intrusion $M = 17.4$ and avoidance $M = 18.9$) of victims of severe MVAs diagnosed with PTSD (Blanchard, Hickling, Vollmer et al., 1995). Table 13 summarizes the allocation of the sample participants into the three groups of symptom severity by the scores obtained on each of the symptom measures.
Table 13. Grouping of 100 MVA Victims by Symptom Severity

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Grp 1 MINIMAL score range</th>
<th>N</th>
<th>Grp 2 MODERATE score range</th>
<th>N</th>
<th>Grp 3 SEVERE score range</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>0-9</td>
<td>27</td>
<td>10-29</td>
<td>48</td>
<td>30-63</td>
<td>25</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0-9</td>
<td>13</td>
<td>10-29</td>
<td>40</td>
<td>30-63</td>
<td>47</td>
</tr>
<tr>
<td>Intrusion</td>
<td>0-15</td>
<td>32</td>
<td>16-25</td>
<td>35</td>
<td>26-35</td>
<td>33</td>
</tr>
<tr>
<td>Avoidance</td>
<td>0-10</td>
<td>34</td>
<td>11-23</td>
<td>35</td>
<td>24-40</td>
<td>31</td>
</tr>
</tbody>
</table>

Data analysis proceeds with comparisons between the three symptom severity groups for each symptom type in relation to the dependent variables. The results of the four one-way Multivariate Analysis of Variance are presented below, one section for each symptom type of interest. In each MANOVA, the dependent variables included: 1) vulnerability to stress, 2) experiences of traumatic events, 3) experiences of death threat prior to the MVA, 4) the experience of death threat at the MVA, 5) reactivation of traumatic memories, 6) family support, 7) medical support, 8) insurance support, 9) family hostility, 10) medical hostility, and 11) insurance hostility.

4.5.1 Analysis of Depression

A one-way multivariate analysis of variance examining the three groups of depression severity indicated that there were significant differences between depression severity groups based on their mean scores on the dependent variables. (Wilks lambda = 0.625, Approx F (22, 172) = 2.07, p = <0.01). Follow up univariate analysis of variance found five dependent variables
to be significantly different due to depression severity grouping. These variables are: vulnerability to stress, $F (2, 96) = 4.40, p < 0.05$; the experience of death threat at the MVA, $F (2, 96) = 4.48, p < 0.05$; hostility received in the family environment, $F (2, 96) = 10.44, p < 0.001$; hostility received in the medical environment, $F (2, 96) = 6.40, p < 0.005$; and hostility received from the insurance environment, $F (2, 96) = 3.16, p < 0.05$. Using eta-square statistic (Cohen, 1988), it was found that these main effects accounted for 8.4%, 8.5%, 17.9%, 11.8%, and 6.2% of the variance, respectively.

Post-hoc analysis of the one-way effects was performed to assess the differences between depression severity groups. Student-Newman-Keuls statistic revealed a significant difference between the group with severe depression symptoms and the group with minimal depression symptoms for the vulnerability to stress variable. Results are in the expected direction indicating that individuals in the severe depression group report, on average, greater vulnerability to stress than participants in the minimal depression symptom group and also report more vulnerability to stress, although not significantly, than the moderate depression symptom group.

Similar analysis, showed that the group with severe depression symptoms is significantly different from the minimal depression symptom group for the experience of death threat at the MVA. There was also a significant difference between the moderate depression group and the minimal depression group on this variable. Thus, participants in the group of severe depression symptoms were significantly more likely to have experienced a threat of death at the accident than participants in the group with minimal symptoms. Similarly, participants in the moderate depression symptoms group were significantly more likely than the minimal symptoms group to have experienced a threat of death at the MVA.
Further Post-hoc analysis of group differences using the Student-Newman-Keuls statistic revealed that the group with severe depressive symptoms received more hostility from the family environment and more hostility from the medical environment than the groups with moderate and minimal depressive symptoms.

Student-Newman-Keuls analysis also demonstrated that the group with severe depression symptoms experienced significantly greater levels of hostility from the insurance environment than the group with minimal symptoms. Table 14 summarizes the differences between depression symptoms groups on the above mentioned variables.
Table 14. Group Means for Depression and Post-hoc Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Depression Severity</th>
<th>Mean &amp; SD</th>
<th>Newman-Keuls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grp 1</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>Grp 1 minimal</td>
<td>49.89</td>
<td>10.61</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>53.40</td>
<td>10.74</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>58.52</td>
<td>10.06</td>
</tr>
<tr>
<td>Death Threat</td>
<td>Grp 1 minimal</td>
<td>0.33</td>
<td>0.48</td>
</tr>
<tr>
<td>at MVA</td>
<td>Grp 2 moderate</td>
<td>0.60</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>0.72</td>
<td>0.46</td>
</tr>
<tr>
<td>Family Hostility</td>
<td>Grp 1 minimal</td>
<td>1.37</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>2.09</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>3.24</td>
<td>1.81</td>
</tr>
<tr>
<td>Medical Hostility</td>
<td>Grp 1 minimal</td>
<td>1.48</td>
<td>1.28</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>1.83</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>3.00</td>
<td>2.06</td>
</tr>
<tr>
<td>Insurance Hostility</td>
<td>Grp 1 minimal</td>
<td>3.15</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>3.81</td>
<td>1.40</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>4.64</td>
<td>2.18</td>
</tr>
</tbody>
</table>

* Student-Newman-Keuls significant difference between groups (p <0.05)

4.5.2 Analysis of Anxiety

The analysis conducted using MANOVA to examine the three groups of anxiety severity
showed significant differences between the anxiety groups based on their mean scores on the dependent variables (Wilks lambda = 0.610, Approx $F_0 = 2.19, p < 0.005$). Following the examination of the data by multivariate analysis, univariate analysis were performed to determine the significant dependent variables. Four dependent variables were found to be significantly different due to anxiety severity grouping: The vulnerability to stress, $F (2, 96) = 4.62, p =< 0.05$; the experience of a threat of death at the MVA, $F (2, 96) = 6.79, p < 0.005$; the support received from the medical environment, $F (2, 96) = 3.22, p < 0.05$; and the hostility received in the family environment, $F (2, 96) = 3.23, p < 0.05$. Using eta-squared statistic, these main effects accounted for 8.7%, 12.4%, 6.3% and 6.3% of the variance, respectively.

Post-hoc analysis of the one-way effects using Student-Newman-Keuls statistic (see table 15) show significant differences between the group with severe anxiety symptoms and the group with minimal and moderate anxiety symptoms for vulnerability to stress. Results are in the expected direction indicating that individuals in the severe anxiety group had on average, significantly greater vulnerability to stress than the moderate and minimal anxiety symptom groups.

Similar analysis, showed that the group with severe anxiety symptoms was significantly different from the minimal and moderate symptom groups for the experience of death threat at the MVA. Participants in the group with severe anxiety symptoms were more likely to have experienced a threat of death at the accident than participants in the groups with minimal and moderate symptoms.

Further analysis of group differences using Student-Newman-Keuls statistic revealed that the group with severe anxiety symptoms received significantly more support from the medical
environment than the group with minimal symptoms and more, but not significantly different, than the group with moderate anxiety symptoms.

Student-Newman-Keuls analysis also demonstrated that the group with severe anxiety symptoms received significantly greater levels of hostility from the family environment than the group with moderate symptoms and more hostility but not significantly, than the group with minimal anxiety symptoms.

Table 15. Group Means for Anxiety and Post-hoc analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Anxiety Severity</th>
<th>Mean &amp; SD</th>
<th>Newman-Keuls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grp 1</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>Grp 1 minimal</td>
<td>48.69 12.55</td>
<td></td>
</tr>
<tr>
<td>to Stress</td>
<td>Grp 2 moderate</td>
<td>51.53 11.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>57.04 9.29</td>
<td>*</td>
</tr>
<tr>
<td>Death Threat</td>
<td>Grp 1 minimal</td>
<td>0.31 0.48</td>
<td></td>
</tr>
<tr>
<td>at MVA</td>
<td>Grp 2 moderate</td>
<td>0.42 0.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>0.74 0.44</td>
<td>*</td>
</tr>
<tr>
<td>Medical Support</td>
<td>Grp 1 minimal</td>
<td>4.92 1.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>5.60 1.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>5.93 1.20</td>
<td>*</td>
</tr>
<tr>
<td>Family Hostility</td>
<td>Grp 1 minimal</td>
<td>1.62 1.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>1.87 1.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>2.61 1.77</td>
<td>*</td>
</tr>
</tbody>
</table>

* Student-Newman-Keuls significant difference between groups (p < 0.05)
4.5.3 Analysis of Intrusion

Analysis of Intrusion proceeded using MANOVA and examining the three groups of intrusion symptom severity as the grouping factor and the Pre-MVA, MVA and post-MVA variables as the dependent variables. Results of the MANOVA indicated that there were significant differences between the intrusion symptom groups based on their mean scores on the dependent variables (Wilks lambda = 0.648, Approx. $F(22, 172) = 1.89, p < 0.05$). Follow up univariate analysis found three dependent variables to be significantly different due to symptom severity grouping. These variables were: the experience of traumatic events prior to the MVA, $F(2, 96) = 3.9, p < 0.05$; the experience of death threat at the MVA, $F(2, 96) = 6.2, p < 0.005$; and the hostility received in the family environment, $F(2, 96) = 7.1, p < 0.005$. Using eta-squared statistic (Cohen, 1988), these main effects accounted for 7.5%, 12%, and 13% of the variance, respectively.

Post-hoc analysis of the one-way effects using Student-Newman-Keuls, showed that the group with severe intrusion symptoms was significantly different from the moderate group in the experiences of death threat prior to the MVA but not from the minimal intrusion group. For this variable the group with highest incidence of previous traumatic experiences was the group with moderate symptoms.

Similar analysis, shows significant differences between the group with severe symptoms and the group with minimal and moderate symptoms for the experience of death threat at the accident. Results are in the expected direction indicating the severe intrusion group experienced more often a threat to life in the MVA.

Student-Newman-Keuls analysis also demonstrated that the group with severe intrusion
symptoms was significantly different from the moderate and the minimal intrusion symptom groups. These results indicate that individuals experiencing severe intrusion symptoms received significantly more hostility from their family environment than the other two groups. Table 16 shows the means of the dependent variables by intrusion severity.

### Table 16. Group Means for Intrusion and Post-hoc Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intrusion Severity</th>
<th>Mean &amp; SD</th>
<th>Newman-Keuls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Grp 1</td>
<td>Grp 2</td>
</tr>
<tr>
<td>Previous Trauma</td>
<td>Grp 1 minimal</td>
<td>1.74</td>
<td>1.36</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>2.49</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>1.48</td>
<td>1.48</td>
</tr>
<tr>
<td>Death Threat at MVA</td>
<td>Grp 1 minimal</td>
<td>0.39</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>0.49</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>0.79</td>
<td>0.42</td>
</tr>
<tr>
<td>Family Hostility</td>
<td>Grp 1 minimal</td>
<td>1.71</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>1.83</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>3.00</td>
<td>1.82</td>
</tr>
</tbody>
</table>

* Student-Newman-Keuls significant difference among groups (p < 0.05)

### 4.5.4 Analysis of Avoidance

The MANOVA examining the three groups of avoidance severity indicated a significant differences between avoidance groups based on their means on the dependent variables (Wilks
lambda = 0.645, \( \text{Approx } F(22, 172) = 1.91, p < 0.05 \). Three dependent variables were found to be significantly different due to avoidance severity grouping: the experience of previous death threat \( F(2, 96) = 4.09, p < 0.05 \); the reactivation of traumatic memories \( F(2, 96) = 7.59, p < 0.001 \); and the hostility received in the family recovery environment, \( F(2, 96) = 3.79, p < 0.05 \). Using eta-squared statistics these main effects were found to account for 7.8%, 13.6% and 7.3% of the variance, respectively.

Post-hoc analysis of the one-way effects using Student-Newman-Keuls statistic, showed that the group with severe avoidance symptoms was significantly different from the minimal symptom group for the experiences of death threats prior to the MVA. The group with severe avoidance symptoms experienced significantly more threats of death than the group with minimal symptoms and more death threats but not significantly different than moderate avoidance group.

Similar analysis, shows significant differences between the group with severe avoidance symptoms and the group with minimal and moderate avoidance symptoms for the experiences of reactivation of traumatic memories with the MVA. Results are in the expected direction indicating that the severe avoidance group experienced reactivation more often than the moderate and minimal avoidance symptom groups.

Student-Newman-Keuls analysis also demonstrated that the group with severe avoidance symptoms experienced significantly greater levels of hostility in the family environment than the group with minimal symptoms. Table 17 illustrates the differences between the avoidance severity groups.
Table 17. Group Means for Avoidance and Post-hoc Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Avoidance Severity</th>
<th>Mean &amp; SD</th>
<th>Newman-Keuls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grp 1 minimal</td>
<td>0.55 0.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>0.77 0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>1.23 1.28</td>
<td>*</td>
</tr>
<tr>
<td>Previous Death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat</td>
<td>Grp 1 minimal</td>
<td>0.15 0.36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>0.17 0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>0.52 0.51</td>
<td>* *</td>
</tr>
<tr>
<td>Reactivation of Traumatic Memories</td>
<td>Grp 1 minimal</td>
<td>0.15 0.36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>0.17 0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>0.52 0.51</td>
<td>* *</td>
</tr>
<tr>
<td>Family Hostility</td>
<td>Grp 1 minimal</td>
<td>1.61 1.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 2 moderate</td>
<td>2.29 1.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grp 3 severe</td>
<td>2.68 1.74</td>
<td>* *</td>
</tr>
</tbody>
</table>

* Student-Newman-Keuls significant difference between groups (p < 0.05)

The group analyses described above supports hypothesis 2 showing that the severe symptoms group shows significant differences from the minimal symptom group with respect to the intervening variables. With the exception of support from the family and support from the insurance environment, the intervening variables studied accounted for the variability of psychological symptoms developed after a minor MVA. Overall, support in the recovery environment was not significantly related to the symptoms as a protective variable. Of the three support variables, medical support was the only type of environmental support that accounted for differences in symptom severity (for anxiety) and this relationship was in the opposite
direction. Individuals in the severe group of anxiety symptoms received more rather than less support than the other groups.

Some of the intervening variables (traumatic events, death threats, reactivation of traumatic memories, medical hostility, and insurance hostility), each accounted for the group differences of one type of symptom. One dependent variable (vulnerability to stress), accounted for the group differences for 2 types of symptoms; anxiety and depression. Another intervening variable (death threat at the MVA), accounted for group differences in all symptoms except avoidance and another variable (hostility from the family), accounted for the group differences in all 4 types of symptoms. The group analyses also provided support for hypothesis 3 as it clearly indicated that the hostility received in the recovery environment accounted for more of the psychological symptom variance of the MVA sample than the support received.

All the significant intervening variables were found to be in the expected direction with two exceptions: medical support was greater rather than lesser for the severe anxiety group and the experience of previous traumatic events had greater frequency in the moderate, not in the severe intrusion symptoms group. The complete MANOVA analysis is presented in Appendix D.
CHAPTER 5

DISCUSSION

This study examined the psychological sequelae of minor motor vehicle accidents. More specifically, it attempted to establish the fact that individuals involved in minor MVAs develop psychological symptoms in the severe range regardless the minor nature of their accidents. The second purpose of this research was to explore how individuals with severe psychological symptoms after a minor MVA differ from those individuals who develop moderate or minimal levels of psychological symptoms. In this exploration, variables thought to potentiate the development of psychological symptoms in victims of other stressful and/or traumatic events were studied as they applied to victims of minor MVAs. These variables were studied firstly for their relationships to the symptoms of the participants and secondly for their potential to differentiate and to account for the degree of severity of psychological symptomatology following a minor MVA. The final objective of this study was to establish if there were any variables that could be thought of as being protective for developing psychological symptoms after a minor MVA with a specific focus on the role of social support.

The following discussion will summarize the findings, address each hypothesis within the context of previous research, and suggest implications for intervention and future research.

5.1 Psychological Symptoms

One of the unique features of this study was the exclusive focus on minor MVAs. Only a few MVA studies have considered MVA severity in their inclusion criteria and these have taken
into account the severity of the MVA mainly for purposes of excluding minor MVAs, thus including in their sample patients who were hospitalized as well as those who had lost consciousness (Blanchard, Hickling, Taylor & Loos, 1995; Blanchard, Hickling, Mitnick et al., 1995; Blanchard, Hickling Vollmer, et al., 1995). Just recently, one study classified the severity of the MVA by the severity of the injury (Bryant & Harvey, 1995) and provided the following indexing criteria: 1. No injury, 2. Mild injury not requiring hospitalization, 3. Injury requiring hospitalization for less than 2 weeks, 4. Injury requiring hospitalization for more than 2 weeks and 5. The MVA involved a fatality. This indexing criteria would classify the sample of the present study as severity 2 in a range of 1 to 5, thus providing validation for the criteria used in the present study to determine the minor severity of the MVAs. All comparisons of the results of this study with previous research will be discussed taking into consideration the minor severity of the MVA as the distinctive feature of the present study.

The results of this study confirmed the first hypothesis. The findings of the analysis of the descriptive data indicated that the participants of the current study developed a range of psychological symptoms including severe levels of depression, anxiety, intrusion and avoidance symptoms as result of their involvement in minor MVAs. The results supported the prediction that some individuals develop severe psychological symptoms regardless the minor severity, or as referred to by Pilowsky (1985) the "trivial nature," of their accidents. In order to place these results in the context of previous research it is necessary however, given the limited studies in the area, to make comparisons with studies conducted with samples of MVA victims who were involved in accidents of a greater magnitude as indicated by the severity of their injuries and/or conducted with samples of patients seeking psychological treatment. Therefore, for most
comparisons, information about the sample studied in previous research will be provided.

Severe depression symptoms were reported by 25% of the sample of MVA victims. The percentage of severely depressed participants found in the present study is similar to the proportion of depressed victims of MVAs reported by Parker (1977) in her analysis of a subgroup sample of 296 accident litigants with "neurotic"/psychological symptoms where she found that 21% of the subgroup suffering from depression. Goldberg and Gara (1990) reported a higher proportion (43.6%) of severely depressed individuals in a sample of patients referred for psychological treatment after relatively minor MVAs. Their sample was different to the sample in the present study in that, although trying to control for head injury, it included individuals who were briefly unconscious at the MVA and also included a high proportion (56%) of individuals involved in litigation.

Severe anxiety symptoms were reported by 47% of the participants of this research study; almost half of the sample became significantly anxious as a result of the accident. This proportion is higher than the 35% experiencing general anxiety reported by Parker's (1977) in her subgroup of MVA victims with neurotic symptoms. Her analysis also revealed that 35% of the sample was experiencing phobias, however, it appears that these proportions were not exclusive and cannot be combined to yield a total of 70%. Therefore it can be reasonable assumed that the true proportion of individuals experiencing anxiety symptoms including both general anxiety and phobias in Parker's study was somewhere between 35% and 70%, as is the result of the present study. In this regard it is necessary to recall that the measure used in the current research, the Beck Anxiety Inventory (BAI), comprises symptoms considered to represent anxiety experienced in panic, phobia and generalized anxiety disorders (Beck & Steer, 1990). The all-inclusive nature
of the BAI may provide a broader estimation of the incidence of severe anxiety found in victims of MVAs when compared to incidences of anxiety reported by diagnostic labels.

It has been hypothesized that MVAs have a phobia-generating effect (Kuch et al., 1991). Previous studies focusing on phobic anxiety after MVAs have found associations between MVAs and phobias much higher compared to the findings of the present study. Proportions of accident phobias higher than the 47% of individuals with severe anxiety found in this research were reported in two clinical studies that enrolled heterogeneous samples including patients seen in psychiatric facilities and individuals referred for medico-legal assessments (Kuch et al., 1985; Kuch, 1989). Kuch et al. (1985) found that 77% of the patients referred for assessment after MVAs suffered of driving phobia and in a later study Kuch (1989) found that 71.2% of a medico-legal sample suffered of specific MVA related phobia. Similarly, 60% of patients referred for treatment of post-traumatic headaches were found to be suffering of driving phobia (Hickling, Blanchard, Silverman et al., 1992). The samples in the studies cited were all preselected symptomatic individuals referred for assessments after MVAs of different severity and involved in litigation. In contrast, the sample of the present research included asymptomatic individuals and the entire sample was free of litigation involvement. When these differences are considered, the finding of 47% of individuals developing anxiety in the severe range as result of a minor MVA seems significantly high.

In terms of post traumatic symptoms of intrusion and avoidance, the sample means for both of those symptoms for the entire MVA sample were similar to the means of the clinical samples in the normalization study (Horowitz et al., 1979). These results indicate that the level of post-MVA distress experienced by the sample in the present study was of similar magnitude
to that of a clinical sample. The clinical sample in the normalization study was comprised entirely of distressed individuals seeking treatment. In comparison, about one third (31%) of all individuals in the MVA sample reported not experiencing psychological symptoms and 50% of the MVA victims did not seek or receive psychological treatment. Thus, the MVA sample mean, although containing an asymptomatic group, indicated levels of distress high enough to compare with a clinical sample. On this basis, it was reasonable to assume that the MVA sample contained a group of very high scores indicative of severe intrusion and avoidance symptoms. Therefore, the sample was partitioned into three groups of symptom severity by percentile partition. The proportion of participants considered to have severe intrusion symptoms was 33% and for severe avoidance symptoms was 31%. Since these proportions were arbitrarily set to obtain three symptom severity groups, they can be seen as rather conservative in their reflection of the actual number of participants who developed severe post traumatic symptoms.

The results of the IES can also be interpreted using the total scale scores. Significant post traumatic stress has been defined as total score greater than 30 on the Impact of Events Scale (Bryant & Harvey, 1995). Using this criterion those investigators found that 20% of a sample of previously hospitalized MVA victims tested 1 year after their MVA reported current levels of significant post traumatic stress. Applying the same criterion to the MVA sample in the present study a much greater proportion of individuals (65%) with significant post traumatic stress was found. This higher finding can be attributed in part to the retroactive administration of the IES in the present study which allowed for the endorsement of symptoms experienced at any point in time after the MVA as long as the symptoms were perceived as a result of the MVA and therefore, representing not only current but also past symptomatology. It is likely that the
proportion of participants with current symptoms of post traumatic stress, if measured a year after the MVA, would have been lower than 65%. However, the information sought in the present study was whether significant or severe symptoms develop after a minor MVA and necessarily included present and past symptomatology. In answer to that question, this result can reasonably be interpreted as indicating that 65% of the participants of this study developed significant levels of post traumatic stress at some point after the minor MVA thus confirming the first hypothesis.

Horowitz's information processing theory (Horowitz, 1979) suggests that the symptoms of intrusion and avoidance are part of the normal cognitive processing of a traumatic event and that what makes the stress response pathological is the intensity and duration of these symptoms. The responses of the participants of this study reflect the intensity of their avoidance and intrusion symptoms during the time period from the MVA day to the time of the research interview. No information regarding the duration of these symptoms was obtained with the IES. Based on Horowitz' theory, we can assume that the proportion of participants in the present study who developed less significant levels of intrusion and avoidance (below 30 according to the criterion cited in Bryant & Harvey, 1995) were having some intrusion and avoidance experiences which were part of the normal processing of the MVA event.

Based on the intensity of their symptoms, 65% of this sample reported symptoms of an intensity considered significant post traumatic stress as a result of the minor MVA. The high proportion of significant post traumatic stress found in the present study is similar to the finding reported by Hickling and Blanchard (1992) in a study of victims of more serious MVAs seeking physical treatment (for headaches and pain). Their results indicated that 50% of the sample met
the criteria for PTSD and another 15% had subsyndromal manifestations of the disorder. These figures yield a total of 65% of their sample experiencing significant levels of post traumatic stress, the same proportion found in the present study for victims of minor MVAs.

Participants in the present study not only developed severe levels of depression, anxiety, intrusion and avoidance but the severity levels of their symptoms were correlated. Correlations among the symptom measures were highly significant and indicate that participants developed similar severity in the four types of symptom categories. Thus, individuals developing severe symptoms in one type also developed severe symptom levels in the other symptoms’ clusters. These results are consistent with the findings of Blanchard et al. (1994) in terms of coexistence of severe psychological symptoms. Their study revealed a high proportion of diagnosed PTSD and major depression in victims of MVAs. In their sample of 50 individuals recently involved in MVAs, 46% met the criteria for PTSD and of those individuals with PTSD 48% also met the criteria for major depression developing after the MVA. The MVAs in their sample however, were of greater severity, in terms of the resulting physical injuries, than the MVA sample in the present study. The participants in their study included hospitalized patients and there was no mention of controlling for loss of consciousness or other means to account for possible post-concussive symptomatology confounding the psychological symptom levels.

In summary, to answer the first hypothesis which predicted the development of a range of psychological symptoms including severe levels as a result of minor MVAs, the results of this study indicate that individuals involved in minor MVA develop such range, including severe psychological symptoms and that the proportions of participants developing severe symptoms are generally comparable with, and in some instances equal to, incidences of psychological
symptomatology reported for victims of more severe MVAs.

5.2 Psychological Symptoms and Intervening Variables

The second hypothesis of the present study predicted that the group of participants developing severe psychological symptoms would be different from the group with minimal symptoms in the intervening variables and that this group would report higher vulnerability to stress, greater exposure to traumatic events and death threats prior to the MVAs, greater incidence of fear of death during the MVA and of reactivation of traumatic memories with the MVA and they would also report receiving higher levels of hostility and lower levels of support from the recovery environment. Some significant relationships between the intervening variables are worth mentioning before proceeding with the discussion of their relationships with psychological symptoms. First, it must be pointed out that vulnerability to stress was not related to other pre-MVA variables nor to any MVA variable. These results indicate that individuals highly vulnerable to stress did not experience more traumatic experiences or death threats prior to the MVA, nor were more likely to experience a threat to their lives during the MVA or reactivation of traumatic memories due to the MVA and suggest that their vulnerability was not related to previous trauma and did not predispose them to experience a death threat in a frightening event such as the MVA. The association regarding vulnerability to stress points more in the direction of the post-MVA environment since the most vulnerable participants reported receiving significantly more hostility from the family and from the insurance environment.

A significant inverse relationship was found between the experience of a death threat at the accident and previous traumatic experiences indicating that people who had experienced
more traumatic events prior to the accident were less likely to experience a death threat at the MVA and suggesting an inoculation effect. On the other hand, this result may also indicate that individuals with little exposure to traumatic events in their lives were more likely to be frightened by a minor MVA and to experience a threat to their lives in the MVA.

Previous experiences of death threats were unrelated to the fear of death experienced at the MVA. Reactivation of traumatic memories was positively related to the experiences of previous traumatic events and of death threats prior to the MVA and this strong relationship was expected since reactivation of memories was contingent on the other two experiences.

Among the post-MVA variables, all the measures of support were negative correlated with their counterpart measure of hostility. Individuals who received high levels of hostility from any one of the three recovery environments received low levels of support from that same environments and those who received low hostility received high support. This finding is meaningful in view of the importance of high hostility and the lack of importance of low support in their relationship to the severity of psychological symptoms that was found in the present study and is discussed further in the “recovery environment” section of this chapter.

Significant relationships were found between the intervening variables and the psychological symptoms. Of these relationships the most significant are the associations of the experience of a death threat during the MVA and the hostility received from the family with every type of symptom developed as result of the accident. Participants who experienced a threat to their life in the accident and higher levels of family hostility during recovery also reported higher levels in all psychological symptoms. A death threat at the MVA had the most significant relationship with anxiety and family hostility was more significantly related to depression. Also,
noteworthy is the strong relationship of medical hostility with higher levels of avoidance, anxiety and depression symptoms. When looking at the overall recovery environment, hostility was more frequently and more significantly related to psychological symptoms than support. The predicted negative relationship between low levels of support and high symptomatology in the second hypothesis was not found.

Vulnerability to stress was related to symptoms of anxiety and depression but not to post-traumatic symptoms of intrusion and avoidance. Reactivation of traumatic memories was related to avoidance and anxiety but not to intrusion symptoms as it was observed during The Gulf war in Vietnam veterans who developed exacerbations of the entire PTSD symptom cluster (Long et al., 1994). Given that the memories reactivated in the sample of the present study included traumatic events other than MVAs one can speculate that some participants could have experienced intrusions of those past events and not intrusions related to the MVA (personal clinical experience) which were not captured by the specific MVA items of the modified version of the IES used in this study.

In addition to the relationships identified by the correlational analysis, the results of the group analyses of the present study indicate that the intervening variables, as a group, accounted for significant amounts of the variability in the severity of all four symptom types: depression, anxiety, intrusion and avoidance. These results may contribute to an explanation of the observed severe psychological symptomatology resulting from minor MVAs. Different intervening variables were significant in accounting for the differences in group severity of each of the symptom clusters, with two variables being highly discriminant and one variable being non discriminant. Of the highly discriminating variables, family hostility accounted for the severity
of all four symptom types and the experience of a death threat at the MVA accounting for the severity of three symptom clusters with the fourth symptom type, avoidance, having a strong tendency toward significance. Family support was the only variable that did not account for differences in symptom severity. For clarity purposes the results of each type of psychological symptoms with respect to the intervening variables will be discussed separately.

5.2.1 Depression Symptoms

Depression symptoms were significantly correlated to vulnerability to stress, a death threat at the MVA and to hostility from the family, medical and insurance environments.

Participants in this study reported a wide range of depressive symptoms. When the sample was classified into 3 severity groups, 27% of the sample was in the minimal group, 48% in the moderate group and 25% in the severe symptom group. Results of the group analysis indicated that individuals in the severe depression group reported, on average, greater vulnerability to stress than participants in the minimal depression symptom group and they were more likely to have experienced a death threat in the MVA. The moderate depression group had also experienced a significant higher incidence of a death threat in the MVA than the minimal depression group. These results suggest that the perception of a threat of death is not only a significant variable in the etiology of PTSD resulting from exposure to a stressful event but that it may also play an important role in the development of depressive symptoms following the event.

Hostility in the recovery environment was a major discriminant variable for the severity of depressive symptoms. All three types of received hostility explored in this study were able to
significantly differentiate the severe symptom group from the minimal symptom group and, with the exception of insurance hostility, the severe symptom group was also significantly different that the moderate symptom group. The degree of the received hostility increased from the minimal depression group to the moderate and severe group in all three environments. The severe symptom group received more hostility from the family, from the medical environment and from the insurance related environment than any of the other symptom groups.

All of the results of the analysis of depression symptoms were found in the direction predicted by the second hypothesis.

5.2.2 Anxiety Symptoms

Anxiety symptoms were found to be significantly correlated to vulnerability to stress, the experience of a death threat at the MVA, reactivation of traumatic memories and to family and medical hostility.

A wide range of anxiety symptoms was reported by the participants in the present study. When classified into 3 groups by symptom severity the groups were comprised as follows: Thirteen percent of the sample had minimal or no symptoms, 40% of the participants manifested moderate anxiety and 47% of the sample reported symptoms of anxiety in the severe range resulting from the MVA. Of note are the high proportion of individuals (87%) who reported moderate to severe anxiety symptoms compared to the low proportion (13%) reporting minimal or no symptoms of anxiety after a minor MVA. This result suggests that a minor MVA is an anxiety generating event.

When the data was investigated for differences in the three groups of anxiety symptoms
severity, several intervening variables were found to be discriminant. The severe anxiety group reported significantly greater vulnerability to stress than the moderate and the minimal symptom groups. The relationship was in the expected direction with the levels of vulnerability to stress found to increase from the minimal to the severe anxiety groups. These results suggest that individuals with a tendency to experience negative affects are at risk to develop severe levels of anxiety following a minor MVA. The severe anxiety group was also more likely to have experienced a death threat in the MVA. More participants in the severe anxiety group experienced a threat to their lives than those in the moderate and minimal group. These results indicate that individuals who experience a death threat in a minor MVA are more likely to develop severe levels of anxiety. These results are consistent with the new DSM IV diagnostic criteria for PTSD, an anxiety disorder, which includes the perception of a threat to life by the individual exposed to a stressful event (APA, 1994).

Support received in the medical environment was found to be a discriminant variable of group severity for anxiety symptoms. However, the results were found opposite to the direction predicted by the second hypothesis. The group analysis indicated that the severely anxious participants received significantly more instead of less support from the medical environment than the participants with minimal symptoms. The discrepancy between the predicted and obtained result may reflect a supportive response of the medical environment to the severely anxious individuals. The medical environment may have included rehabilitation professionals dealing with minor soft tissue injury who need to deal with anxiety, usually manifested as somatic tension, for the successful resolution of physical symptoms. It is likely that this environment also included psychological counselling as involvement in psychological treatment was reported by
50% of the participants of the present study.

Hostility from the family was the next environmental variable found to discriminate the severe anxious group from the less anxious groups. The group with severe anxiety received significantly more hostility from the family recovery environment. These results are consistent with Gottlieb's (1985) perspective suggesting that in a support network not all relationships are supportive and that negative relationships constitute added stressors to the individual recovering from a stressful event thus, increasing the victim's level of anxiety.

With the exception of support from the medical environment, all the significant intervening variables analyzed for anxiety symptoms were found in the direction predicted by the second hypothesis.

5.2.3 Intrusion Symptoms

Intrusion symptoms were significantly correlated to the perception of a death threat in the MVA and to hostility from the family environment indicating that the participants who developed higher levels of intrusion symptoms were more likely to have feared for their lives at the MVA and received greater hostility from their family environment.

As previously discussed, the analysis of the scores of the MVA participants on the intrusion scale of the IES included a comparison to the scores of bereaved adults studied by Horowitz et al., (1982). The participants of the present study, as a group, were as distressed by intrusive symptoms as the Horowitz's clinical sample and significantly more distressed by intrusion than the non-clinical sample in the normalization study. When the MVA sample was divided into three groups by symptom severity, some of the intervening variables were found to
have a discriminating effect among intrusion severity groups. It was calculated that 33% of the sample experienced severe intrusion symptoms. This group was significantly different from the moderate and minimal symptom group in some of their experiences pre and post-MVA as well as in the MVA. Individuals in the severe group had significantly fewer experiences of traumatic events prior to the MVA than the moderate intrusion group and experienced less, although not significantly, traumatic events than the minimal group. This result is not in the direction predicted by the second hypothesis which anticipated more experiences of traumatic events in the group with severe symptoms. It is noteworthy that this sample was considerably more exposed to traumatic events that the sample in the clinical study of Breslau et al. (1991) who reported 39% exposure and also more exposed than a sample of the general population (Norris, 1992) who found 69% incidence of exposure to traumatic events over a lifetime. Despite the fact that 80% of the participants of the present study had experienced one or more traumatic events in their lives, their exposure was not found to be a vulnerability factor. This result may be understood from the perspective that the experience of previous traumatic events may have an inoculation (Meichenbaum, 1985) or protective effect rather than a vulnerability effect on the development of psychological symptoms after a minor MVA. On the other hand, this result may simply reflect the fact that having exposure to a traumatic event does not necessarily mean that the person experienced the event as traumatic and therefore, the event itself may be of no consequence to the individual’s subsequent adaptation to a stressful event.

The perception of a death threat at the MVA was a significant discriminant variable for the symptoms of intrusion. Participants in the group with severe intrusion symptoms were significantly more likely to have experienced a threat of death in the accident than the moderate
and minimal symptom group. This result is consistent with previous reports of the importance of the subjective appraisal of danger and threat of loss of life during a traumatic experience in the development of symptoms of PTSD, one of which is intrusion (APA, 1994; Kilpatrick et al. 1989). This finding adds support to the observation that regardless of the objective or "material" (car damage) severity of a MVA, it is the perception of a threat to life which makes the MVA traumatic (personal clinical experience). In this manner, a minor MVA can be as traumatizing as a severe MVA for the individual who perceives extreme danger to his or her life.

This finding is consistent with findings in a recent study of PTSD symptoms of hospitalized MVA victims (Bryant & Harvey, 1995) who found that objective measures of trauma severity were not associated with IES intrusion symptoms but that perceived severity was significantly related to post traumatic intrusions. These results are also consistent with the findings of Blanchard, Hickling, Mitnick et al. (1995) who found that the measure of fear of death differentiated 3 subgroups (PTSD, partial PTSD and no PTSD) of victims of severe MVAs.

The severity of the intrusion symptoms was also well discriminated by the hostility the participant received in the family environment. The group with severe intrusion symptoms received significantly more hostility from the family than the moderate and minimal symptom group. A hostile family environment may not originate intrusion (the IES intrusion items were specifically related to the MVA) but may serve to exacerbate or maintain existing symptoms of intrusion resulting from the MVA by preventing the working through, through interaction, of the traumatic memories. It may also have an effect by creating a fearful cognitive-emotional state which would then be mood-congruent (Blaney, 1996) with the fear experienced in the MVA, thus intensifying the emotional response to the MVA. Looking at this finding from the
perspective of the family, it may indicate that the family may be hostile due to lack of understanding of the intrusive symptomatology or even due to disbelief in the victim's report of psychological distress after such a "minor" event. This result can also be an indication of family dysfunction predating the MVA to which the victim, due to the MVA, is more exposed. Effects of family hostility in the psychological sequelae of MVA victims has not been previously studied and thus, no other results are available for comparison at this time.

5.2.4 Avoidance Symptoms

Results of the present study indicated that avoidance symptoms were correlated significantly to the experience of threats of death prior to the accident. the experience of a death threat during the MVA, the reactivation of traumatic memories and to family and medical hostility in the recovery environment.

The MVA sample of this research was found to be similarly distressed by avoidance symptoms as Horowitz's clinical sample and significantly more avoidant than the non-clinical sample in the normalization study (Horowitz et al., 1979). When the MVA sample was analyzed by three groups of symptom severity, results indicated that the severe avoidance group was significantly different from the moderate and minimal symptom group in some of their experiences pre and post-MVA as well as in the MVA.

The experience of death threat resulting from traumatic events previous to the MVA was a variable that discriminated the severe avoidance symptom group from the group with minimal avoidance symptoms. Individuals in the severe group reported significantly more experiences of death threats prior to the accident that the minimal group. These results indicate that participants
in the severe avoidant group, although not experiencing more traumatic events than the other groups, experienced traumatic events which involved a threat to life and therefore, may have experienced a stress reaction prior to the MVA which could sensitize them to avoidance symptoms after a minor MVA.

Reactivation of memories of past trauma discriminated the group with severe avoidant symptoms from the other two groups. Participants in the group of high avoidance symptoms reported significantly more memories from past traumatic events triggered by the MVA. This result is consistent with the evolutionary perspective (Oatley & Duncan, 1992; Oatley & Jenkins, 1992) that suggests that memories accompanied by profound emotional impact and threat are recalled when a cognitive-emotional state similar to that of the event is evoked and that these memories are adaptive and help to recall previous coping patterns, in this case avoidance.

Hostility received in the family environment was another intervening variable found to discriminate the severity of the avoidance symptoms of the MVAs victims. Participants in the severe avoidance symptom group received significantly more hostility from the family environment than the moderate and minimal symptom groups.

All of the significant results of the analysis of the avoidance symptoms were found to be in the direction predicted by the second hypothesis.

When the results of intrusion and avoidance are considered jointly as post traumatic symptoms, some comparisons with previous research are indicated. Earlier research suggests that previous trauma sensitizes or predisposes the individual to develop PTSD symptoms when confronted with a new traumatic event (Breslaw et al, 1994). Studies of victims of severe MVA found that those victims who developed PTSD were more likely to have experienced previous
trauma prior to the MVA and to have been diagnosed with PTSD as result of that trauma (Blanchard et al, 1994). The results of the analysis of the intrusion and avoidance symptoms (part of the diagnostic criteria of PTSD) in the present study with victims of minor MVAs however, do not completely agree with those findings. Previous traumatic events were not related to psychological symptoms in the correlational analysis and, although they were found to discriminate group severity for intrusion, the direction of the results indicated a protective, rather than a vulnerability effect for victims of minor MVAs. However, the experience that was identified as a vulnerability factor was a death threat during those traumatic events prior to the MVA as it was more frequently reported by the participants in the severe avoidance group. Although the experience of traumatic events had a protective effect for intrusive symptoms, when it was accompanied by a threat to the participant’s life, it had a vulnerability effect for avoidance symptoms. Since the results of this study revealed that what seems to make a minor MVA severely distressing is the perception of a death threat at the MVA, it can be reasonable assumed that those previous traumatic events which involved a death threat were also highly distressing to the participant. Therefore, it can be concluded from these results that the subjective experience during those previous traumatic events is a factor which may predispose the MVA victim to develop high levels of avoidance after a minor MVA. Of note is the fact that the severe avoidant group, who experienced more death threats prior to the MVA, also experienced significantly more reactivation of memories of those traumatic events. From the evolutionary perspective, this suggests that the threat to life during those earlier events having a profound emotional impact, facilitated their recall after a minor MVA which may have evoked a similar cognitive-emotional state to that experienced during the previous event.
The lack of relationship between exposure to previous traumatic events and severity of psychological symptoms found in the present study is more in agreement with results reported by Goldberg and Gara (1989) in a study of victims of MVAs of lesser severity than the study of Blanchard et al. (1994). Goldberg and Gara found that psychological symptoms developed after MVAs had no relationship to the presence of significant life events prior to the accident. In their study however, there was no mention of the subjective impact of the significant events to determine whether the reported significant life events were experienced as traumatic by the individuals, whereas the Blanchard et al. (1994) sample included MVA victims which had been previously diagnosed with PTSD and obviously experienced the past events as traumatic. In conjunction, the results of the present research and the results of the two comparison studies (Blanchard et al., 1994; Goldberg & Gara, 1989) suggest that exposure to previous traumatic events is not a vulnerability factor for higher symptomatology after MVAs. These results point more in the direction of the individual’s subjective appraisal of those past events.

5.3 The Recovery Environment

Results of the present study support the third hypothesis which predicted that hostility in the recovery environment of the MVA victim would account for more of the variability in psychological symptoms than the support the MVA victim received in the recovery environment. In general, the measures of hostility received in the recovery environment related more significantly to psychological symptoms than the measures of support. Overall, participants received greater amounts of support from the family and the medical environment than hostility from those environments. The entire sample received, on average, less support from the
insurance and more hostility from the insurance environment than from any of the other environments. When combining the results for support and hostility from all 3 different recovery environments, it was found that the MVA sample received overall, more support than hostility from the combined environment however, it was hostility the variable that significantly differentiated the severe group in each of the symptom groups from the less severe symptom groups.

Hostility from the insurance and the medical environment was significantly related to the severity of depression. The severe depressed group received more hostility from these two recovery environments in addition to more hostility from the family. Hostility from the family accounted for the difference in symptom severity in all the symptom measures. The strong relationship between the hostility in the family environment and all the severe symptom groups indicate that family environment is most important in the adjustment to a minor MVA experience. These results are consistent with results of a clinical study reported by Smith-Landsman et al. (1990) that indicated that ratings of poor family functioning were significantly related to elevated levels of psychiatric symptoms after the accidents in a sample of severely injured accident patients.

The fact that the participants in the present study in the severe symptom groups were more likely to rate their families as more hostile toward them can be explained in several ways. Hostility in the family environment may create sufficient stress in the individual to affect the development and maintenance of psychological symptoms. When more than one family member has been involved in the MVA, the psychological symptomatology of other family members may play a role in the disruption of normal family functioning and the expression of hostility among
family members. Also, the family system may have been dysfunctional before the MVA and the MVA victim, due to accident related limitations, is more exposed to contact with the family. As well, the experience of having a member with high levels of psychological distress after a MVA may exacerbate difficulties in the family functioning and facilitate the expression of hostility. Conversely, individuals with higher psychological distress may be more likely, due to their symptoms, to tune in or to become more reactive to the negative signals from the family environment.

Overall, support was not related to higher psychological distress in this sample of minor MVA victims and the severe symptom groups of depression, anxiety, intrusion and avoidance did not report lower levels of support in the recovery environment as predicted in the second hypothesis. These findings are contrary to the previously reported protective role of social support in the recovery of war veterans and victims of disasters (Barrett & Mizes, 1988; Madakasira & O’Brian, 1987) where inadequate social support was found to increase the risk of pathological adjustment following the event, and also contrary to the importance of family support reported by Foeckler et al. (1978) in the resolution of crisis following MVAs involving fatalities. These results are consistent however, with the findings of Horowitz et al. (1981) who found that the degree of social support in a sample of bereaved patients did not relate closely to their distress which was measured using the Impact of Events Scale, the same measure used in the present study. The discrepancies between the above cited studies can be understood by fact that the studies with victims of severe trauma (war, disaster, fatal MVA) seem to have focused on the course of symptomatology rather than the onset as in the present study and in Horowitz’s study. It has been reported that the variables that predict the onset of symptoms are not
necessarily the variables which predict the course of symptomatology (Monroe, Bromet, Connell & Steiner, 1986). As well, these results can be interpreted simply as indicating that social support may not have the important and critical effect on prevention of psychological distress after common events such as bereavement or minor MVAs as it has been reported to have after extraordinary events such as war, disasters and fatal MVAs.

The only support variable that was found significant in differentiating symptom severity groups did so in a direction opposite the predicted one. Support from the medical environment was significantly greater in the group with severe symptoms of anxiety. Medical support in this case was not related with decreased symptomatology as predicted in the first hypothesis, but was related to increased anxiety symptoms. Severely anxious MVA victims received more support from the medical environment. The medical support results do not indicate a protective or "buffering" effect in the MVA victim's anxiety as predicted by Cohen and Wills' model (Cohen & Wills, 1985) but point in the direction of a "reactive" effect. These results suggest that the medical environment may have responded supportively to the most anxious patients and may have included supportive psychological treatment.

Summary

The results of the present study indicate that individuals involved in minor MVA develop severe levels of symptoms of depression, anxiety, intrusion and avoidance regardless the minor nature of their accidents. These results imply that individuals with a tendency to experience negative affects are at risk to develop severe levels of anxiety and depression following a minor MVA but that this vulnerability does not have an effect in the development of post traumatic
symptoms of intrusion and avoidance. The results demonstrated that it was not severity of the MVA but the experience of the MVA as threatening to the victim’s life the factor which increased vulnerability for higher psychological symptomatology after minor MVAs. When compared to previous research involving severely injured MVA victims, the similar levels of psychological distress found in the present study suggest that overall, the severity of the injury in a MVA does not play an essential role in the development of psychological symptoms, instead, subjective factors such as fear for one’s life and environmental factors such as hostility in the recovery environment, play a more significant role in the onset of symptomatology. The results of the current research demonstrated that exposure to previous traumatic events do not predispose MVA victims to higher symptomatology after a minor MVA but that previous experiences of traumatic events in which there has been a death threat may have a vulnerability effect. Overall the findings of the current research point to the important effect of negative relationships in the post-MVA environment and particularly to the significance of a hostile family environment in development of severity psychological symptoms. The lack of importance of support as a protective or buffering variable for psychological symptoms after minor MVAs in the context of the significance of hostility as a vulnerability factor is perhaps the most interesting finding of the present study.

5.4 Limitations of the study

While this study contributes to the understanding of the psychological sequelae of minor MVAs, several limitations should be mentioned.

First, as in all studies with volunteers, this volunteer sample may have been a self-selected
sample of the minor MVA population and thus it may preclude the generation of valid inferences regarding the total minor MVA population. Volunteers could have been systematically different in terms of distress or intervening variables than those who did not volunteer. Second, the measures were administered in a retroactive fashion, and although efforts were made to control for memory bias (age limits, time limits after the MVA), it is possible that memory loss and the current psychological state of the participants could have affected their recall of past symptomatology, their assessment of the pre-MVA personality functioning and/or their perceptions of the recovery environment. It could also be possible that some participants may have been experiencing high levels of psychological symptoms before the minor MVA. Third, this study did not control for the degree of pain of the participants, a variable that is frequently observed the MVA population despite the minor severity of their physical injuries and a variable that may contribute to the development of psychological symptoms. Fourth, although this study attempted to control for the coexistence of psychological and post-concussive symptoms, (do symptoms reflect psychological distress or organic damage?), the effort to control for this confounded variable in the inclusion criteria of this study, no loss of consciousness, may have been insufficient. This is a probability since it is possible to suffer a traumatic brain injury from the acceleration forces involved in a MVA without having experienced loss of consciousness (Sweeney, 1992). Fifth, the present study relied on self-report questionnaires and thus it is difficult to assess the possible bias in the reports. However, as the present research was specifically designed to capture the phenomenological aspects of minor MVAs, it was necessary to rely solely on the participants’ reports.
5.5 Implications for Intervention

The results of the present study support the recent change of criteria for PTSD in DSM IV (APA, 1994) shifting the focus from the severity of an event to the subjective experience of the individual in a stressful event to consider the diagnosis. These findings substantiate the potential traumatizing effect of even very minor MVAs based on the individual’s experience in the MVA.

Besides contributing to the diagnostic aspect of assessing a minor MVA victim, these findings may call attention to the many variables that in conjunction with the experience of a MVA are affecting the individual’s response and adaptation to the event. Assessments should be carefully planned to include not only symptom measures but also regular consideration to specific pre-MVA variables as well as to the post-MVA environment in which the patient recovers.

In regards to pre-MVA variables, this study may contribute to a better understanding of the differential impact of past traumatic events. The results suggest that being exposed to or experiencing a traumatic event is different from experiencing an event as traumatic. This difference may be particularly useful when assessing past and current trauma in multicultural populations exposed to a variety of events uncommon in Canadian culture. Assessing the impact of rather than exposure to past traumatic events, considering if they were accompanied by an experience of a threat to life, and/or generated emotional memories which may have been reactivated by the MVA may give the clinician a clearer understanding of factors which may be influencing the manifestation of severe distress after a minor MVA before reaching erroneous diagnostic conclusions such as malingering or placing unjustified attention to pre-MVA events.
This information may also assist the clinician to form better estimations of a prognosis and more accurate predictions regarding the length of treatment to return the MVAs victim to the pre-MVA level of functioning. An accurate prognosis has become a more salient professional issue in the treatment of MVA victims in view of the constraints placed on the duration of psychological treatment by third party payment issues and due to the expansion of managed health care to Canada.

In terms of post-MVA variables, the importance of family hostility in relation to the severity of symptomatology points to implications for intervention involving education of the family about the state of the MVA victim to increase their understanding of the psychological symptoms presented by the affected family member. Most important, family interventions must be geared not to increase support but to prevent hostility. Family counselling may be considered as a treatment modality since families may need help to deal with the stress created by the MVA, particularly if more than one member of the family has been in the accident. Patients whose family environments were hostile before the MVA should be considered at risk for developing higher psychological symptoms after a minor MVA. Cognitive therapies may help the patient deal with their perception and interpretation of the hostility from the general environment as well as to deal with the realities of the MVA recovery environment which is likely to be compromised by negative interactions.

It is important to note that the present study was conducted with participants who were not involved in litigation and had the MVA under a “no-fault” legislation bill that is about to be changed as this research is completed. The new legislation will bring back the practice of suing for damages and benefits to which the MVA victims are entitled under the current bill. With this
change the future MVA victim will likely encounter a recovery environment increasingly confrontational and hostile. The importance of a hostile recovery environment found in the present study and its strong association with high levels of depression may be an underestimation of the distress minor MVA victims may experience in the future.

5.5 Implications for Future Research

The results of this study point to several directions for future research in this area.

Ideally, prospective, longitudinal studies should be undertaken where the vulnerability and protective factors are measured before exposure to MVAs thus preventing the possibility that the reports about the intervening variables would be influenced by the psychological states produced by the MVA. Future investigations might focus on the course and duration of the symptoms developed as result of minor MVAs and how these relate to the intensity of the reported symptoms and to the intervening factors.

In general, the findings of the current research point to the important effect of the negative relationships in the post-MVA environment and in particular to the significance of a hostile family environment in the development of severe psychological symptomatology. Further research is needed in order to understand the role that environmental hostility plays in the development of psychological symptoms in the MVA population, particularly when the probability of encountering hostile interactions may be higher for this population. A more detailed subdivision of the interactions in the medical and the insurance environment, excluding the interactions which are generally perceived as supportive such as psychological counselling in the medical environment and legal counselling in the insurance environment, is required to
identify the most hostile interactions and their relationship to severe symptomatology.

In view of the lack of relationship of support and the strong relationship of hostility to symptomatology that was found in the present study, it could be argued that lack of hostility toward the victim may have been indirectly measured in the support studies which attribute support a buffering effect. Similarly, when family history of anxiety, instability and deviance were considered to increase vulnerability to traumatic reactions (Breslaw et al., 1991; Davidson et al., 1985) the hostility received by the victim in such family environment could have been the vulnerability factor. Several alternative explanations for this finding from the perspective of the MVA victim and of the family were previously discussed in “the recovery environment” section of this chapter. The number of possible explanations points to the need for further investigations focusing on this variable to clarify the family dynamics responsible for the strong association between family hostility and psychological symptoms after minor MVAs.

Despite the many questions which remain unanswered and the limitations of the present study, it is felt that the positive findings of this research, particularly the findings related to how the victim experienced the minor MVA, contribute to a clearer understanding of the variables involved in the psychological symptomatology resulting from a minor MVA, at least in the population from which this sample was drawn.
REFERENCES


APPENDIX A

1. Letter to Physicians

2. Letter to Rehabilitation Clinics

3. Summary of the Study

4. Recruiting Ad
Appendix A. Letter to Physicians

Toronto, Date

Dr. Name
Address

Dear Dr.:

I am a doctoral candidate in Applied Psychology at The Ontario Institute for Studies in Education (OISE), University of Toronto. I am presently working on my dissertation related to the psychological sequelae of minor motor vehicle accidents.

I am in the process of interviewing volunteers who have been in a traffic accident in the last 3 years. Volunteers are generally found in the offices of physicians or rehabilitation clinics.

I would appreciate your assistance in obtaining additional participants for my study by displaying some ads (see enclosure) in your office for patients to see. This will require minimal effort and time from your staff as the ads are self explanatory. If you prefer, you may select the participants according to the inclusion criteria and refer them to my office.

The interviews will be conducted at OISE or at any other place convenient to the volunteers. I am enclosing a short description of the research and the criteria regarding the participants.

If you have questions or comments please call me at 322 0240. Understanding you have a busy practice, I will call you within the next two weeks to discuss your possible participation.

Thanks for your cooperation

Sincerely yours

G. Ingrid Gore, M.Ed.
Doctoral Candidate

The Ontario Institute for Studies in Education
Appendix A. Letter to Rehabilitation Clinics

Toronto, Date

Mr.
Rehabilitation Clinic
Address

Dear Mr.

I am a doctoral student from OISE, University of Toronto, working on my doctoral dissertation entitled, *Psychological sequelae of minor motor vehicle accidents: Vulnerability and protective factors*, under the supervision of Dr. Lana Stermac.

I am in the process of collecting data and I am looking for volunteers to participate in my study through the different rehabilitation clinics in Toronto.

I would like to request your cooperation to obtain volunteers from your clinic by allowing some ads (see enclosure) to be placed in the clinic for patients to see. This will require minimal effort and time from your staff as the ads are self-explanatory.

In appreciation for your cooperation you will be provided with a copy of the study upon its completion. A presentation to your staff can also be arranged. I look forward to hear from you at 322 0240 to arrange a suitable time to place the ads.

Thank you very much

Sincerely Yours

Ingrid Gore. M.Ed.
Doctoral Candidate

The Ontario Institute for Studies in Education
Appendix A. Summary of the study

PSYCHOLOGICAL SEQUELAE OF MINOR MOTOR VEHICLE ACCIDENTS:
VULNERABILITY AND PROTECTIVE FACTORS

SUMMARY OF THE STUDY

One hundred victims of minor motor vehicle accidents (MVAs), who have sought medical attention after their accidents will be tested for psychological symptoms resulting from the MVA. The instruments to be used are standardized self-report questionnaires widely used in clinical practice and research. Some factors considered in the literature as predisposing to or protective from negative psychological reactions in victims of other traumatic events will be explored. These factors will be studied in relationship to a minor motor vehicle accident as the traumatic event. The factors to be studied are the threat of death during the event, the experience of trauma and death threat prior to the MVAs, the experience of support and hostility in the recovery environment and personality factors.

MEASURES: The presence, type and severity of psychological symptoms will be measured by the Beck Depression Inventory, the Beck Anxiety Inventory and the Impact of Events Scale. The NEO Five Factor Inventory will be used to determine personality traits. The Traumatic Stress Schedule will be used to assess previous life trauma and death threat, and a questionnaire specially constructed for this research will be used to assess support and hostility in the recovery environment.

INCLUSION CRITERIA: In order to meet the criteria for inclusion in the study subjects must be adults between the ages of 18 and 65,
* who were involved in a MVA between 1 and 3 years of the testing date,
* who suffered minor physical injuries in the MVA (sought medical attention but were not hospitalized)
* who did not suffer loss of consciousness in the MVA, and
* who are not currently involved in litigation (formal legal procedures against the insurer).

PROCEDURE: Subjects will be tested in individual sessions lasting approximately one hour and they will be paid for their time. The location of testing will be accommodated to the needs of the participants. Special care will be given to ensure that all the information will remain confidential. The questionnaires will be identified with codes known only to the principal researchers. No identifying information about clinics or subjects will be included in the study when the results are analyzed or published. Interested individuals are welcome to obtain a written summary of the results at the completion of the study. Participation is voluntary and participants can withdraw from the study at any time.

This research has been approved by an Ethics Committee for research on human subjects at the Ontario Institute for Studies in Education, University of Toronto.

Doctoral Candidate: G. Ingrid Gore, M. Ed.

Dissertation Supervisor: Dr. Lana Stermac, Professor.
Appendix A. Recruitment Ad

HAD A CAR ACCIDENT?
WE INVITE YOU TO PARTICIPATE IN A UNIVERSITY RESEARCH STUDY

*If your accident occurred between

October and March
1992 and 1995

*If you did not lose consciousness in the accident
  * If you were not admitted to a hospital
  * If you sought medical attention

* YOU WILL COMPLETE SIX QUESTIONNAIRES

* IT WILL TAKE 35 MINUTES TO AN HOUR

* A SMALL REMUNERATION WILL BE PAID TO YOU

* ALL INFORMATION WILL BE CONFIDENTIAL

PLEASE CALL INGRID GORE AT 322 0240
APPENDIX B

Participant Consent Letter
Appendix B. Participant Consent Letter

I would like to invite you to participate in a research study to be conducted at The Ontario Institute for Studies in Education (OISE), University of Toronto. This study is being undertaken in partial fulfilment of my degree of Doctor of Education in Applied Psychology.

The study will examine the emotional consequences of motor vehicle accidents. This entails asking written questions to persons, such as yourself, who have been involved in vehicle accident. The information gathered will help us to better understand emotional reactions after motor vehicle accidents.

If you agree to participate you will meet with me at OISE to complete a series of questionnaires related to your experience in the motor vehicle accident and during the period of recovery from the accident. Some questions will relate to some of your personal experiences before the car accident. The questionnaires, although gentle, will require you to focus on sensitive psychological issues and you may experience some emotional discomfort. I will be available to discuss any of these issues with you and to assist you if necessary.

The time involved will be approximately an hour. You will be provided a small amount of money to cover the costs of transportation, child care or other extra expenses incurred in your effort to be at OISE to answer the questionnaires. If you prefer an alternative location, this can also be arranged.

Special care will be given to ensure that all the information you provide will remain confidential and that your name will remain anonymous. In fact, the questionnaires will not have your name on them but a code that will be known only to my supervisor and myself. No information that could identify you will be included in the study when the results are analyzed or published. The raw data will be stored in a locked place and will be disposed of after the dissertation is completed. You are welcome to obtain a written summary of the results at the completion of the study.

Your participation is voluntary and you can withdraw from the study at any time. If you do not wish to continue participating, your data will be immediately destroyed. If you have any questions about the confidentiality procedures or any other aspect of the study do not hesitate to contact me at 322-0240.

Thank you, in advance, for your participation.

G. Ingrid Gore, M. Ed.,

Department of Applied Psychology, O.I.S.E.
I am willing to participate in the study as described in the consent letter.

Signature ___________________________ Date ______
APPENDIX C

MEASURES

1. Demographic Questionnaire and MVA Information
2. Modified Version of the Revised Impact of Events Scale
   3. Modified Version of the Beck Anxiety Inventory
4. Modified Version of the Beck Depression Inventory
   5. Support-Hostility Questionnaire
6. Modified Version of the Traumatic Stress Schedule
### Appendix C. Demographic Questionnaire and MVA Information

<table>
<thead>
<tr>
<th>CODE NUMBER</th>
<th>PHONE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **NAME**

2. **GENDER**
   - M___
   - F___

3. **AGE**
4. **MARITAL STATUS**
   - Single___
   - Married___
   - Divorced___
   - Other___

5. **ETHNIC BACKGROUND**
   - Where born: ____________________________
   - Years in Canada: ________________________

6. **EDUCATION COMPLETED**
   - primary school _____
   - high school _____
   - college _____
   - university _____
   - postgraduate degree _____

7. **OCCUPATION**

8. **MOTOR VEHICLE ACCIDENT (MVA)**
   - Date: ____________________________

   **MVA TYPE**
   - Rear end _____
   - Front end _____
   - Side collision _____

   Did you receive physical injuries? YES___ NO___
   Did you hit your head? YES___ NO___
   Did you lose consciousness? YES___ NO___
   Were you hospitalized? YES___ NO___
   Did you receive medical treatment? YES___ NO___
      (emergency, doctor, specialist)
   Did you receive physical treatment? YES___ NO___
      (physiotherapy, chiropractor, etc.)
   How long did you have physical symptoms? ____________________
   Did you receive psychological treatment? YES___ NO___
      (psychologist, psychiatrist, counsellor)
   How long did you have psychological symptoms? ____________________
   Did you miss work/school? YES___ NO___
   Did you hire a lawyer? YES___ NO___
   Did you start legal procedures? (Legal suit) YES___ NO___
   If yes, are legal procedures finished? YES___ NO___
   Did you fully recover from the accident? YES___ NO___

9. **HOUSEHOLD**
   - Number of adults excluding yourself ______
   - Number of children younger than 18 ______
   - Number of children younger than 18 ______
Appendix C. Modified Revised Impact of Event Scale

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 AS A RESULT OF THE MOTOR VEHICLE ACCIDENT. If they did not occur during that time, please mark the "not at all" column.

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

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you were bothered by each symptom AS A RÉSULT OF THE MOTOR VEHICLE ACCIDENT, by placing an X in the corresponding space in the column next to each symptom.

**MILDLY** = it did not bother me much  
**MODERATELY** = it was very unpleasant, but I could stand it  
**SEVERELY** = I could barely stand it

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Mildly</th>
<th>Moderately</th>
<th>Severely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Numbness or tingling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Feeling hot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Wobbliness in the legs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Unable to relax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Fear of the worst happening</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Dizzy or light headed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Heart pounding or racing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Unsteady</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Terrified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Nervous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Feelings of choking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Hands trembling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Shaky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Fear of losing control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Difficulty breathing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Fear of dying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Scared</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Indigestion or discomfort in the abdomen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Faint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Face flushed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Sweating (not due to heat)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C. Modified Beck Depression Inventory

This questionnaire consists of 21 groups of statements. After reading each group of statements carefully, circle the number (0, 1, 2, or 3) next to the one statement in each group which best describes the way you felt as a result of the motor vehicle accident. If several statements within a group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

AS A RESULT OF THE MOTOR VEHICLE ACCIDENT

1. 0 I did not feel sad
    1 I felt sad
    2 I was sad all the time and I couldn't snap out of it
    3 I was so sad or unhappy that I could not stand it

2. 0 I was not particularly discouraged about the future
    1 I felt discouraged about the future
    2 I felt I had nothing to look forward to
    3 I felt that the future was hopeless and that things could not improve

3. 0 I did not feel like a failure
    1 I felt I had failed more than the average person
    2 As I looked back on my life, all I could see were a lot of failures
    3 I felt I was a complete failure as a person

4. 0 I got as much satisfaction out of things as I used to
    1 I didn't enjoy things the way I used to
    2 I didn't get real satisfaction out of things anymore
    3 I was dissatisfied or bored with everything

5. 0 I didn't feel particularly guilty
    1 I felt guilty a good part of the time
    2 I felt quite guilty most of the time
    3 I felt guilty all the time

6. 0 I didn't feel I was being punished
    1 I felt I may have been punished
    2 I expected to be punished
    3 I felt I was being punished
# AS A RESULT OF THE MOTOR VEHICLE ACCIDENT

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>0</td>
<td>I didn't feel disappointed in myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I was disappointed in myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I was disgusted with myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I hated myself</td>
<td></td>
</tr>
</tbody>
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<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>0</td>
<td>I didn't feel I was worse than anybody else</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I was critical of myself for my weaknesses or mistakes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I blamed myself all the time for my faults</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I blamed myself for everything bad that happened</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>0</td>
<td>I didn't have any thoughts of killing myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I had thoughts of killing myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I would have liked to kill myself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I would have killed myself if I had the chance</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>0</td>
<td>I didn't cry more than usual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I cried more than I used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I cried all the time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I couldn't cry even if I wanted to</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>0</td>
<td>I was no more irritated than I ever was</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I got annoyed or irritated more easily than I used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I felt irritated all the time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I didn't get irritated by the things that used to irritate me</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>0</td>
<td>I did not lose interest in other people</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I was less interested in other people than I used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I lost most of my interest in other people</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I lost all my interest in other people</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>0</td>
<td>I made decisions as well as I ever could</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I put off making decisions more than I used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I had greater difficulty in making decisions than before</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I couldn't make decisions at all</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>0</td>
<td>I didn't feel that I looked any worse than I used to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>I was worried that I was looking old or unattractive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I felt that there were permanent changes in my appearance that made me look unattractive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I believed that I looked ugly</td>
<td></td>
</tr>
</tbody>
</table>
## AS A RESULT OF THE MOTOR VEHICLE ACCIDENT

15. | 0 | I could work about as well as before |
|    | 1 | It took an extra effort to get started at doing something |
|    | 2 | I had to push myself very hard to do anything |
|    | 3 | I couldn't do any work at all |

16. | 0 | I could sleep as well as usual |
|    | 1 | I didn't sleep as well as I used to |
|    | 2 | I woke up 1-2 hours earlier than usual and found it hard to get back to sleep |
|    | 3 | I woke up several hours earlier than I used to and couldn't get back to sleep |

17. | 0 | I didn't get more tired than usual |
|    | 1 | I got tired more easily than I used to |
|    | 2 | I got tired from doing almost anything |
|    | 3 | I was too tired to do anything |

18. | 0 | My appetite was no worse than usual |
|    | 1 | My appetite was not as good as usual |
|    | 2 | My appetite was much worse |
|    | 3 | I had no appetite at all |

19. | 0 | I didn't lose much weight, if any, at the time |
|    | 1 | I lost more than 5 pounds |
|    | 2 | I lost more than 10 pounds |
|    | 3 | I lost more than 15 pounds |

I was purposely trying to lose weight by eating less  **YES  NO**

20. | 0 | I was no more worried about my health than usual |
|    | 1 | I was worried about physical problems such as aches and pains, or upset stomach, or constipation |
|    | 2 | I was very worried about physical problems and it was hard to think of much else |
|    | 3 | I was so worried about my physical problems that I could not think about anything else |

21. | 0 | I did not notice any change in my interest in sex |
|    | 1 | I was less interested in sex than I used to be |
|    | 2 | I was much less interested in sex |
|    | 3 | I lost interest in sex completely |
Appendix C. Support-Hostility Questionnaire

SOCIAL SUPPORT is defined as the comfort, assistance, and/or information one receives through contacts with individuals or groups. These contacts may be verbal or non-verbal and they need to be perceived as helpful.

DURING THE PERIOD FOLLOWING THE ACCIDENT, RECOVERY PERIOD, DID YOU RECEIVE ANY SOCIAL SUPPORT FROM:

<table>
<thead>
<tr>
<th></th>
<th>a. Your family environment (partner, spouse, children, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>b. Your medical environment (chiropractors, physiotherapists, doctors, etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>c. Your insurance environment (insurance staff, adjustors, lawyers, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

HOSTILITY is defined as the state of having or expressing enmity or opposition, being antagonistic or unfriendly.

DURING THE PERIOD FOLLOWING THE ACCIDENT, RECOVERY PERIOD, DID YOU EXPERIENCE ANY HOSTILITY FROM:

<table>
<thead>
<tr>
<th></th>
<th>a. Your family environment (partner, spouse, children, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
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<tr>
<td></td>
<td>7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>b. Your medical environment (chiropractors, physiotherapists, doctors, etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>c. Your insurance environment (insurance staff, adjustors, lawyers, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td></td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix C. Modified Traumatic Stress Schedule

Some of your previous life experiences are important to us, please circle YES or NO to the following

DURING THE COURSE OF YOUR LIFE

1. Did anyone take something from you by force or threat to force, such as in a robbery, mugging, or hold up? YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO

2. Did anyone beat you up or attacked you? YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO

3. Did anyone made you have sex by using force or threatening to you? This includes any type of unwanted sexual activity. YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO

4. Were you in a motor vehicle accident serious enough to cause injury to one or more passengers? YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO

   (This question refers to a previous motor vehicle accident)

5. Did a loved one died because of an accident, homicide, or suicide? YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO

6. Did you suffer injury or property damage because of fire, severe weather or a natural or manmade disaster? YES NO
   IF YES,
   Did you ever feel your life was in danger during the incident? YES NO
DURING THE COURSE OF YOUR LIFE

7. Were you ever forced to evacuate from your home or did you otherwise learn of an imminent hazard in your environment?  
   IF YES,  
   Did you ever feel your life was in danger during the incident?  
   YES NO

8. Did you have some other terrifying or shocking experience?  
   IF YES,  
   Did you ever feel your life was in danger during the incident?  
   YES NO

9. Has the motor vehicle accident in anyway brought back painful memories of any of those experiences?  
   YES NO
   IF YES, which one?  
   Just give the number/s

AT THE TIME OF THE COLLISION IN THE MOTOR VEHICLE ACCIDENT

10. Did you feel that your life or the life of anyone in your vehicle was in danger?  
    YES NO
APPENDIX D

MULTIVARIATE ANALYSES OF VARIANCE (MANOVA)
MULTIVARIATE ANALYSIS OF VARIANCE FOR DEPRESSION

-> MANOVA
-> tneur tsstra tssdth react1 dthmval supfam supmed supins hostam hosted
-> nosins BY bdicat3(1 3)
-> /PRINT SIGNIF(MULT UNIV ) SIGNIF(EFSIZE)
-> /NOPRINT PARAM(ESTM)
-> /POWER .1 3 9 .05
-> /MEANS TABLES( bdicat3 )
-> /METHOD=UNIQUE
-> /ERROR WITHIN-RESIDUAL
-> /DESIGN

*** Analysis of Variance ***

99 cases accepted.
0 cases rejected because of out-of-range factor values.
1 case rejected because of missing data.
3 non-empty cells.

1 design will be processed.

*** Analysis of Variance -- design 1 ***

Combined Observed Means for BDICAT3
Variable ... TNEUR
BDICAT3
1 UNWGT. 49.88889
2 UNWGT. 53.40426
3 UNWGT. 58.52000

Variable ... TSSTRA
BDICAT3
1 UNWGT. 2.11111
2 UNWGT. 1.89362
3 UNWGT. 1.76000

Variable ... TSSDTH
BDICAT3
1 UNWGT. .91481
2 UNWGT. .90851
3 UNWGT. .92000

Variable ... REACT1
BDICAT3
1 UNWGT. .18519
2 UNWGT. .25532
3 UNWGT. .40000

Variable ... DTHMVAL
BDICAT3
1 UNWGT. .33333
2 UNWGT. .99574
3 UNWGT. .2000
Variable : SUPFAM
   BDICAT3
   1  UNWGT.  5.37037
   2  UNWGT.  5.27660
   3  UNWGT.  4.88000

Variable : SUPMED
   BDICAT3
   1  UNWGT.  5.33333
   2  UNWGT.  5.78723
   3  UNWGT.  5.80000

Variable : SUPINS
   BDICAT3
   1  UNWGT.  3.70370
   2  UNWGT.  3.61702
   3  UNWGT.  3.32000

Variable : HOSFAM
   BDICAT3
   1  UNWGT.  1.37037
   2  UNWGT.  2.08511
   3  UNWGT.  3.24000

Variable : HOSMED
   BDICAT3
   1  UNWGT.  1.48148
   2  UNWGT.  1.82979
   3  UNWGT.  3.00000

Variable : HOSINS
   BDICAT3
   1  UNWGT.  2.14815
   2  UNWGT.  3.80851
   3  UNWGT.  4.64000

**Analysis of Variance -- design 1**

EFFECT : BDICAT3
Multivariate Tests of Significance (S = 2, M = 4, N = 42)

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Approx. F</th>
<th>Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>.62486</td>
<td>2.07226</td>
<td>22.00</td>
<td>172.00</td>
<td>.005</td>
</tr>
<tr>
<td>Reys</td>
<td>.35572</td>
<td></td>
<td></td>
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</tbody>
</table>

Note: F statistic for WILKS' Lambda is exact.

Multivariate Effect Size and Observed Power at .0500 Level

<table>
<thead>
<tr>
<th>TEST NAME</th>
<th>Effect Size</th>
<th>Noncent.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>.210</td>
<td>45.590</td>
<td>.99</td>
</tr>
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</table>
### EFFECT: BDICAT3 (Cont.)

Univariate F-tests with 12,461 D. F.

<table>
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<tr>
<th>Variable</th>
<th>Hypoth. SS</th>
<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
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</thead>
<tbody>
<tr>
<td>TNEUR</td>
<td>976.94590</td>
<td>10658.2258</td>
<td>488.47295</td>
<td>111.02315</td>
<td>4.39974</td>
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<tr>
<td>TSSTFA</td>
<td>1.65878</td>
<td>245.69475</td>
<td>.82939</td>
<td>2.55312</td>
<td>.32407</td>
<td>.724</td>
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<tr>
<td>TSSTDTH</td>
<td>22.347</td>
<td>97.19067</td>
<td>.11174</td>
<td>1.01240</td>
<td>.1037</td>
<td>.996</td>
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<tr>
<td>REACTI</td>
<td>5.2612</td>
<td>19.01024</td>
<td>.31306</td>
<td>1.9802</td>
<td>.58092</td>
<td>.211</td>
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<td>DTHMDVAL</td>
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<td>22.35915</td>
<td>1.04265</td>
<td>.2125</td>
<td>4.47465</td>
<td>.014</td>
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<td>1.80952</td>
<td>3.06605</td>
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<td>.556</td>
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<td>4.08517</td>
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<td>.769</td>
</tr>
<tr>
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<tr>
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<td>1.15715</td>
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</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>ETA Square</th>
<th>Noncent.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNEUR</td>
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<td>.74626</td>
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<td>TSSTFA</td>
<td>.00671</td>
<td>.64813</td>
<td>.10401</td>
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<td>TSSTDTH</td>
<td>.00229</td>
<td>.22073</td>
<td>.06843</td>
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<td>.316185</td>
<td>.32658</td>
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<td>.75404</td>
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<td>.18036</td>
<td>.14802</td>
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<td>.99354</td>
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<td>6.31439</td>
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</table>
MULTIVARIATE ANALYSIS OF VARIANCE FOR ANXIETY (BAICAT3)

-> MANOVA
   -> tneur tsstra tssdth react1 dthmvai supfam supmed supins hosfam hosmed
   -> hosins BY baicat3(1 3)
   -> /PRINT SIGNIF(MULT UNIV) SIGNIF(EFSIZE)
   -> /NOPRINT PARAM(ESTIM)
   -> /POWER T(.05) F1.05
   -> /O MEANS TABLES ( baicat3 )
   -> /P MEANS TABLES ( baicat3 )
   -> /METHOD=UNIQUE
   -> /ERROR WITHIN=RESIDUAL
   -> /DESIGN

****** Analysis of Variance ******

99 cases accepted.
0 cases rejected because of out-of-range factor values.
1 case rejected because of missing data.
3 non-empty cells.
1 design will be processed.

****** Analysis of Variance -- design 1 ******

Combined Observed Means for BAICAT3
Variable   ... TNEUR
BAICAT3
     1 UNWGT. 48.69231
     2 UNWGT. 51.57500
     3 UNWGT. 57.04348

Variable   ... TSSTRA
BAICAT3
     1 UNWGT. 1.84615
     2 UNWGT. 1.97500
     3 UNWGT. 1.89130

Variable   ... TSSDTH
BAICAT3
     1 UNWGT. .84615
     2 UNWGT. .82500
     3 UNWGT. .84783

Variable   ... REACT1
BAICAT3
     1 UNWGT. .15385
     2 UNWGT. .20000
     3 UNWGT. .36957

Variable   ... DTHMVAL
BAICAT3
     1 UNWGT. .30766
     2 UNWGT. .42500
     3 UNWGT. .73913
Variable SUPFAM
BAICAT3
1    UNWGT.  5.00000
2    UNWGT.  5.15000
3    UNWGT.  5.30435

Variable SUPMED
BAICAT3
1    UNWGT.  4.92308
2    UNWGT.  5.60000
3    UNWGT.  5.93478

Variable SUPINS
BAICAT3
1    UNWGT.  1.28462
2    UNWGT.  3.60000
3    UNWGT.  3.58696

Variable HOSFAM
BAICAT3
1    UNWGT.  1.61538
2    UNWGT.  1.87500
3    UNWGT.  2.60870

Variable HOSEMED
BAICAT3
1    UNWGT.  1.46154
2    UNWGT.  1.72500
3    UNWGT.  2.45652

Variable HOINS
BAICAT3
1    UNWGT.  3.76923
2    UNWGT.  3.35000
3    UNWGT.  4.28261

** Analysis of Variance -- design 1 **

EFFECT BAICAT3
Multivariate Tests of Significance (S = 2, M = 4, N = 42)

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Approx. F Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>0.61011</td>
<td>2.19108</td>
<td>22.00</td>
<td>172.00</td>
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<tr>
<td>Roy's</td>
<td>0.36654</td>
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<td></td>
</tr>
</tbody>
</table>

Note: F statistic for WILKS' Lambda is exact.

Multivariate Effect Size and Observed Power at .0500 Level

<table>
<thead>
<tr>
<th>TEST NAME</th>
<th>Effect Size</th>
<th>Noncent. Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>0.219</td>
<td>48.204</td>
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### Univariate F-tests (Cont.)

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<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. of F</th>
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<tbody>
<tr>
<td>TNEUR</td>
<td>1020.71444</td>
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<tr>
<td>TSSTRA</td>
<td>.22371</td>
<td>147.12382</td>
<td>.11485</td>
<td>2.57421</td>
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<td>.956</td>
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<tr>
<td>TSSDTH</td>
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<td>97.40209</td>
<td>.00603</td>
<td>1.01404</td>
<td>.00594</td>
<td>.994</td>
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<tr>
<td>REACT1</td>
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<td>.41333</td>
<td>.19593</td>
<td>2.10554</td>
<td>.127</td>
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<tr>
<td>SUPFAM</td>
<td>1.12047</td>
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<td>3.09207</td>
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<td>.835</td>
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<tr>
<td>SUPMED</td>
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<td>1.65966</td>
<td>3.21529</td>
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<td>9.15941</td>
<td>2.52509</td>
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<td>2.79811</td>
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<td>1.99933</td>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>ETA Square</th>
<th>Noncent.</th>
<th>Power</th>
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<tbody>
<tr>
<td>TNEUR</td>
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</tr>
<tr>
<td>TSSTRA</td>
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<td>TSSDTH</td>
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<tr>
<td>REACT1</td>
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<td>DTHMV1</td>
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<td>SUPFAM</td>
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<td>HOSFAM</td>
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<tr>
<td>HOSMED</td>
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<tr>
<td>HOSINS</td>
<td>.03980</td>
<td>.40153</td>
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MULTIVARIATE ANALYSIS OF VARIANCE FOR INTRUSION (IESINT3)

- MANOVA
- CHEUR TSSTRA TSSOTH REACT1 DTHMVAL SUPPM SUPFM SUPAM SUPINS NOSIAM NOSMED
- NOSINS BY IESINT3 (1 3)
- /PRINT SIGNIF(MLT UNIV) SIGNIF(EFSIZE)
- /NOPRINT PARAM(ESTRIM)
- /POWER T (.05) F(.05)
- /OMEANS TABLES (IESINT3)
- /METHOD=UNIQUE
- /ERROR WITHIN-RESIDUAL
- /DESIGN

***** Analysis of Variance *****

99 cases accepted.
0 cases rejected because of out-of-range factor values
1 case rejected because of missing data
3 non-empty cells
1 design will be processed.

***** Analysis of Variance -- design: *****

Combined Observed Means for IESINT3

Variable . . . TNEUR
IESINT3
IESINT3
1 . . UNWGT. 52.45161
2 . . UNWGT. 52.82857
3 . . UNWGT. 55.90909

Variable . . . TSSTRA
IESINT3
IESINT3
1 . . UNWGT. 1.74194
2 . . UNWGT. 2.48571
3 . . UNWGT. 1.48485

Variable . . . TSSOTH
IESINT3
IESINT3
1 . . UNWGT. .80645
2 . . UNWGT. 1.00000
3 . . UNWGT. .69697

Variable . . . REACT1
IESINT3
IESINT3
1 . . UNWGT. .16129
2 . . UNWGT. .28571
3 . . UNWGT. .36364

Variable . . . DTHMVAL
IESINT3
IESINT3
1 . . UNWGT. .38710
2 . . UNWGT. .48571
3 . . UNWGT. .78788
### Variable: SUPFAM

<table>
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<tbody>
<tr>
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<td>2</td>
<td>5.2574</td>
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<td>3</td>
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### Variable: SUPMED

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<td>5.6285</td>
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<td>3</td>
<td>5.93939</td>
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### Variable: SUPINS

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<td>3</td>
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### Variable: HOSFAM

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<tbody>
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### Variable: HOSMED

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<tbody>
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<tr>
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<td>2.02857</td>
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<tr>
<td>3</td>
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### Variable: HOSINS

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<td>3.48571</td>
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<tr>
<td>3</td>
<td>4.54545</td>
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**Analysis of Variance - design 1**

**EFFECT .. IESINT3**

Multivariate Tests of Significance ($S = 2, M = 4, N = 42$)

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Approx. F Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
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</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>.64804</td>
<td>1.79972</td>
<td>22.22</td>
<td>.013</td>
</tr>
<tr>
<td>Roy's</td>
<td>.30154</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: F statistic for Wilks' Lambda is exact

---

Multivariate Effect Size and Observed Power at .05 Level

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<th>TEST NAME</th>
<th>Effect Size</th>
<th>Noncent.</th>
<th>Power</th>
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<tbody>
<tr>
<td>Wilks</td>
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<td>41.662</td>
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### EFFECT... IESINT (Cont.)

**Univariate F-tests with 12.96 D.F.**

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<th>Error SS</th>
<th>Hypoth. MS</th>
<th>Error MS</th>
<th>F</th>
<th>Sig. &amp; F</th>
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<td>TNEUR</td>
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<tr>
<td>TSSDTH</td>
<td>1.60573</td>
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<td>80.297</td>
<td>99.000</td>
<td>.90447</td>
<td>.150</td>
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<td>2.34748</td>
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<td>HOSMED</td>
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<td>4.48105</td>
<td>2.87445</td>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>ETA Square</th>
<th>Noncent.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
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<tr>
<td>HOSINS</td>
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<td>5.34280</td>
<td>.51825</td>
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MULTIVARIATE ANALYSIS OF VARIANCE FOR AVOIDANCE IESAV3

```
-> MANOVA
-> tneur tsstra tssdth react1 ntmval suptam supmed hosiam nosmed
-> /PRINT SIGNIF=MULT UNIV /SIGNIF=EPSIZE
-> /DESIGN

***** Analysis of Variance *****

99 cases accepted.
0 cases rejected because of out-of-range factor values.
1 case rejected because of missing data.
3 non-empty cells.
1 design will be processed.

***** Analysis of Variance -- design *****

Combined Observed Means for IESAV3
Variable .. TNEUR
IESAV3
  1  UNWT.  51.78788
  2  UNWT.  55.51429
  3  UNWT.  53.80645

Variable .. TSSTRA
IESAV3
  1  UNWT.  1.84848
  2  UNWT.  1.77143
  3  UNWT.  1.16129

Variable .. TSSDTH
IESAV3
  1  UNWT.  0.54545
  2  UNWT.  0.77143
  3  UNWT.  1.22581

Variable .. REACT1
IESAV3
  1  UNWT.  .15152
  2  UNWT.  .17143
  3  UNWT.  .14613

Variable .. NTMVVA
IESAV3
  1  UNWT.  .59394
  2  UNWT.  .62857
  3  UNWT.  .64516
```
### Analysis of Variance -- design : 

**EFFECT** : IESAV3  
Multivariate Tests of Significance IS = 2, M = 4 : N = 42 :

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Value</th>
<th>Approx. F</th>
<th>Hypoth. DF</th>
<th>Error DF</th>
<th>Sig. of F</th>
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</thead>
<tbody>
<tr>
<td>Wilks</td>
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**Note.** F statistic for WILKS' Lambda is exact.

---

**Multivariate Effect Size and Observed Power at .0500 Level**

<table>
<thead>
<tr>
<th>TEST NAME</th>
<th>Effect Size</th>
<th>Noncent.</th>
<th>Power</th>
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<tbody>
<tr>
<td>Wilks</td>
<td>.197</td>
<td>42.107</td>
<td>.98</td>
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### Univariate F-tests with (2, 96) D. F.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypoth. $SS$</th>
<th>Error $SS$</th>
<th>Hypoth. $MS$</th>
<th>Error $MS$</th>
<th>$F$</th>
<th>Sig. of $F$</th>
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<td>1139.0967</td>
<td>118.03750</td>
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<td>1.44282</td>
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### ETA Square, Noncent. Power

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