PSYCHOLOGICAL DISTRESS FOLLOWING A ROAD ACCIDENT: INVESTIGATION OF TWO NEGLECTED ROAD-USER GROUPS

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Psychology in the University of Canterbury by Lee Robert James Kannis-Dymand

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1 During the course of this thesis the author reverted to the use of his Greek family name Kannis; thus, hyphenating his past surname Dymand to Kannis-Dymand.
DEDICATION

This thesis is dedicated to Jamie 'Waka' Patu, a promising young New Zealander who was tragically lost in a road accident.
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ABSTRACT

Road traffic accidents are common sources of trauma experienced by adults, adolescents, and children. Trauma may arise as a direct result of physical injury, may occur due to experiencing perceived threat to one's life or physical self, or may develop due to witnessing death or injury to others. While there has been growing interest in the development of psychological distress, including post-traumatic stress disorder (PTSD), phobias, and adjustment disorder, among survivors of road accidents, there has been no systematic investigation of cyclists involved in road accidents and little specific research into child and adolescent road accident victims.

In regard to cyclists, the first of these under-researched groups, study one investigated the occurrence of psychological distress in New Zealand adult cycling victims. In 1999, 619 cyclists were injured on New Zealand roads, with 86 of these accident victims from the Christchurch region. A sample of 27 Christchurch adult cyclists, who had been involved in an accident with a motor vehicle, at least one month prior to the interview, completed a structured interview and number of questionnaires. Results indicated that one third of the participants suffered ongoing psychological distress following their accident. Implications for mental health, personal wellbeing, and potential costs to the community are discussed.

Study two examined the occurrence of psychological distress in New Zealand child and adolescent road accident survivors. In 2000, 1216 under-15 year-olds were injured on New Zealand roads. A national sample of 19 young people (8-17 year-olds) and their parents completed a variety of assessment measures, including a structured clinical interview in 16 cases. Of the 16 interviewed child/adolescent survivors, 19% were diagnosed with PTSD, and 69% exhibited some significant, enduring psychological distress following their accident. Implications for mental health, educational attainment, family adjustment, and personal wellbeing are discussed.

Part three considered the need for secondary prevention for young road accident victims, including as a priority, means for the identification and recognition of young, road accident survivors who are at risk of developing psychopathology following a road accident. To this end, a draft of a screening guide to enable teachers and medical practitioners to identify these young at risk, road accident victims was developed.
OVERVIEW OF THESIS

The aim of this thesis was to investigate the psychological impact of road accidents on those who experience them. Over the last decade there has been increasing interest in this previously neglected issue. A number of researchers, such as Edward Blanchard and Edward Hickling, have dedicated considerable research time to the exploration of psychological adversity following involvement in a road accident.

For large numbers of people in contemporary societies, road accidents are frequent experiences and often result in psychological distress (Fecteau & Nicki, 1999, Mayou, 1999). Studies (Blanchard, Hickling, Taylor, Loos, & Gerardi, 1994a; Bryant & Harvey, 1995a) estimate that up to around 50% of road accident survivors may develop post-traumatic stress disorder. Further, other psychopathology such as depression, other anxiety disorders, and adjustment disorder may occur. These disorders and lesser levels of psychological distress have the ability to severely disable the road accident victim's mental health and functioning. Such distress can impact on their social interactions, family relationships, education, leisure, and work performance.

The first part of this thesis presents a literature review of psychological consequences following a road accident. Issues discussed include: Epidemiology of road accidents; classification of post-traumatic stress disorder; clinical presentation of psychological symptoms; other classifications such as accident phobia, delayed-onset post-traumatic stress disorder, pseudo-post-traumatic stress disorder, other anxiety disorders, and depression; assessment and etiology; and possible predictors of road accident-related psychological distress. Other issues discussed include, child and elderly road accident victims, head injury, role of alcohol, and future research possibilities.

Following this, two studies into relatively under-researched groups of road accident victims are presented. Firstly, part two of this thesis presents a study of adult cycling accident victims. While other studies have included cyclists in their samples of accident victims there appears to be no specific and systematic research on this group, and, this study appears to be the first to exclusively research this segment of road-
users. Twenty-seven, adult New Zealand cyclists who had been involved in a road accident with a motor vehicle participated in this study. Group results and detailed case presentations are discussed.

Part three of this thesis investigates another neglected group of road accident victims, namely children and adolescents. Stallard (1999) reported that it is only in recent years that young road accident victims have received consideration in the literature. Prior to the presentation of the current study, a review of research into this area is presented. The current study involved 19 New Zealand, children and adolescents who had experienced a road accident. Results are presented and individual case reports are summarised.

Part four of this thesis discusses the need in New Zealand and worldwide for the secondary prevention of psychological distress following a road accident. This requires the reliable identification of road accident victims who may go to develop psychopathology as a consequence of their accident. The second study highlighted that in New Zealand a substantial number of young people are at risk of suffering psychological adversity after experiencing a road accident. Consequently, the researcher and his supervisor identified the need for a screening guide to assist in the recognition of ‘at risk’ young road accident victims. Thus, following a detailed argument for such a guide, an initial draft of Guide to Assessing Flags for Psychological Distress in Young People Following a Road Accident, for teachers and general practitioners is presented. It is intended that this Guide will eventually lead to the development of improved detection of young road accident victims who otherwise might suffer unnecessary psychological distress.

Lastly, while the focus of this thesis is primarily on psychological distress following a road accident, it is useful to outline other levels of trauma-related distress that have been found in New Zealand where the current research took place. The small number of studies reported have examined psychological trauma and distress arising from disaster (tropical cyclone), participation in combat (Vietnam War Veterans), and domestic violence. None have to date investigated the role of road accidents in post-traumatic distress.
An investigation of the psychological after-effects following a cyclone (Cyclone Bola) that struck the East Coast of New Zealand’s North Island in 1988 was reported by Eustace, MacDonald, and Long (1999). Out of the 118 individuals who took part in this research 12% were classified with PTSD and 17% were noted to have high levels of psychological distress. In regard to psychological distress found in New Zealand Vietnam War veterans, MacDonald, Chamberlain, and Long (1997) focused on a group of veterans comprised of 22% Maori (New Zealand’s indigenous people) and 78% non-Maori. Results found that 27% of the Maori veterans and 15% of the non-Maori veterans met classification for PTSD. Of note, this study highlighted the higher rates of PTSD found in Vietnam combat veterans of non-Caucasian cultural origin. MacDonald et al. (1997) noted these results were consistent with international studies focusing on the role of race in PTSD levels for combat veterans.

Research focusing on domestic violence and psychological distress in New Zealand Women (Kazantzis, Flett, Long, MacDonald, & Millar, 2000), from a sample of 961 women ages 19 to 90 years, found at the time of interview that 25% were suffering from psychological distress. Of those experiencing psychological distress, 12% had distress related to domestic violence. The above studies have investigated psychological distress related to trauma in New Zealand; however, there is still the need for ongoing research into levels of psychological distress following trauma in this Pacific nation. At the time of the current research there appeared to be little investigation into psychological sequelae following road accidents in New Zealand. Thus, this research will aim to contribute to this area and to the knowledge base of trauma related psychological distress in the people of New Zealand.
PART ONE:

LITERATURE REVIEW
PART I

LITERATURE REVIEW

Traumatic events and disasters are intrinsic to all societies and are part of the cycle of life (Amir, Kaplan, & Kotler, 1996). A range of adjustment patterns can occur after traumatic events. Among these, post-traumatic stress disorder (PTSD) is probably the most frequent and severe type of post-trauma mental health problem (Freedy & Donkervoet, 1995). PTSD may occur in individuals who are exposed to psychologically traumatic circumstances that would usually evoke symptoms of distress in a majority of people (McCaffey & Fairbank, 1985), and is characterised by intrusive recollections of the traumatic event, disturbed sleep and affect, avoidance of stimuli that may remind the victim of the trauma, and over-arousal (Blanchard, Hickling, Taylor, et al., 1995; McCaffey & Fairbank, 1985).

While substantial clinical and research attention has been paid to the psychological effects of various traumatic events (e.g., rape, combat), systematic study of trauma after road accidents has been neglected until recently (Scotti, Beach, Northrop, Rode, & Forsyth, 1995). Accordingly, Delahanty et al. (1997) noted that relatively little research has addressed the psychological sequelae of motor vehicle accidents (MVAs). Travel by road is fundamental to modern living, nevertheless, it is the source of one of its most frequently faced dangers and traumatic experiences (Cagnetta & Cicognani, 1999; Kuch, Cox, Evans, & Shulman, 1994). Moreover, it has been estimated that up to 50% of MVA survivors will develop PTSD (Bryant & Harvey, 1995a). Fecteau and Nicki (1999) stated that road accidents are “...relatively common events that frequently result in distressing, and sometimes disabling, psychological reactions” (p. 201).

The aim of this section is to review and discuss the issues associated with MVA-related PTSD. Initially, epidemiology, classification, and issues of comorbidity will be addressed. Following this, a discussion of assessment approaches of PTSD in MVA survivors will be given. In addition, potential causal mechanisms will be presented as well as the predictors that are correlated with the development of PTSD.
following a MVA. Lastly, specific issues will be addressed such as MVA-related PTSD in children and the elderly, head injury and PTSD, and future research considerations. However, treatment issues are beyond the scope of this paper and will not be specifically addressed. One final point - although this review focuses on MVAs, it is important to recognise that pedestrians, cyclists, and witnesses of MVAs are encompassed under the classification of MVA-related PTSD (Blanchard & Hickling, 1997).

1.1 EPIDEMIOLOGY

It has been found that MVAs are the most significant stressor in terms of frequency and severity in the cause of PTSD (Bryant & Harvey, 1995a). According to Hickling and Blanchard (1992), an American driver will endure three MVAs during their driving career; specifically, 19.4% of Americans will be involved in a serious motor accident during their lifetime (Blanchard & Hickling, 1997). In 1999, there were 8010 reported casualty road accidents in New Zealand, resulting in 509 deaths and 11,999 physical injuries; that is, 315 injuries per 100,000 people [Land Transport Safety Authority (LTSA), 2002]. It is estimated that between 5% and 45% of MVA survivors will develop PTSD (Blanchard & Hickling, 1997). Australian research by Bryant and Harvey (1995a) found that 20% of MVA survivors developed PTSD.

Nevertheless, there are issues that make accurate estimates of epidemiology hard to achieve. Firstly, it needs to be noted that a bias may occur. Kuch, Cox, and Evans (1996) pointed out that PTSD is more prevalent in those who seek treatment than in those recruited in nonclinical surveys. Further, Scotti et al. (1995) cautioned that prevalence studies generally fail to specify types of accidents and other reactions that occur that are distinct from PTSD. Importantly, victims who experience PTSD may try to evade discussion about the trauma as they often feel embarrassed about experiencing psychiatric difficulties from a MVA, which they may have perceived as a fairly common occurrence (Burstein, 1989). Hobbs and Mayou (2000) reported that in the initial months after an accident that distress, PTSD, and travel anxiety are often expressed but all may improve over a period of months. However, according to Hobbs and Mayou (2000), at a year or longer post-accident, psychiatric difficulties are evident and are associated with considerable disability. Lastly, psychological
symptoms may be neglected after a MVA due to the attention of the physician and the patient being primarily focused on physical injuries (Burstein, 1989).

1.2 WHAT IS A MOTOR VEHICLE ACCIDENT (MVA)?

Motor vehicle accidents (MVAs) constitute the largest portion of the transportation accident literature (Scotti et al., 1995). Classification of a car accident is usually dependent on the severity of injury to its occupants; that is, the types of wounds and the number of fatalities dictate a MVA's classification (Scotti et al., 1995). Blanchard and Hickling (1997) suggested the following definitions: (1) a minor MVA in which there is only property damage ("fender bender"); and (2) a serious MVA in which one or more individuals are injured enough to seek medical attention within forty-eight hours of the accident. Furthermore, they added that those injured in MVAs may include the driver, passenger(s), or a pedestrian(s), and the vehicle may be an automobile, truck, bus, or motorcycle. Australian researchers Bryant and Harvey (1995b) employed the following scale for MVA severity: 1 = no injury; 2 = mild injury not requiring hospitalisation; 3 = injury requiring hospitalisation for less than two weeks; 4 = injury requiring hospitalisation for more than two weeks; and 5 = the MVA involved a fatality. Lastly, Blanchard and Hickling (1997) noted that there is no validated scale of accident severity and that seriousness of injury does not always correlate with the development of PTSD.

1.3 CLASSIFICATION OF PTSD

Freedy and Donkervoet (1995) noted that the two most commonly used diagnostic classification systems are: the tenth edition of the International Classification of Diseases (ICD-10) classification of Mental and Behavioural Disorders (World Health Organization, 1992); and the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, APA, 1994). Both of these classification systems identify the existence of adjustment disorders and PTSD (Freedy & Donkervoet, 1995). According to Freedy and Donkervoet (1995), both of these conditions include an identifiable stressor proceeded by a debilitating pattern of adjustment (e.g., cognitive disturbances, anxious feelings); however, it is apparent that stressful occurrences and ensuing adjustment patterns are observed as
more intense, menacing, or debilitating (in both the short and long term) in the case of PTSD.

The *ICD-10* classification of mental and behavioural disorders has two diagnostic codes that are dedicated to depicting adjustment to traumatic events: (1) response to severe stress, and adjustment disorders (F43); and, (2) persisting personality changes, not attributable to brain damage and disease (F62). Table 1 gives a brief outline of the mental health conditions specified within these two diagnostic categories. Survivors of trauma may display a wide range of adjustment patterns and their mental health disruptions may manifest immediately (within minutes, hours, or days) or at a later time (weeks, months, or years) after the traumatic event (Freedy & Donkervoet, 1995). The degree of the symptoms and associated functional impairment can range from mild to severe (World Health Organization, 1993). According to *ICD-10* (World Health Organization, 1992) symptoms duration may be a few weeks to months (rarely exceeding six months) or a chronic course that endures for years. *ICD-10* (World Health Organization, 1993) states that a chronic course of PTSD only occurs in a small proportion of patients.

### Table 1. Mental Health Problems Attributable to Environmental Stressors (*ICD-10*)

**F43.1 Posttraumatic Stress Disorder**
A severe and persistent condition that may develop following exposure to an overwhelming traumatic event. Symptom onset ranges from immediate to delayed (rarely exceeds 6 months following event onset). Typically symptoms include intrusive memories, emotional numbness, withdrawal, avoidance, and a state of hyperarousal and anxiety.

**F43.2 Adjustment Disorders**
Emotional distress and functional impairment that usually arise within 1 month of a stressful event. The duration of symptoms rarely exceeds 6 months. Typical presentations include depressive reactions, mixed depressed and anxious features, disturbance of other emotion, disturbance of conduct, and mixed disturbance of emotions and conduct.

**F62.0 Enduring Personality Change After Catastrophic Experience**
The personality change is profound, lasting, and in response to an extreme traumatic event. In some cases (not all), PTSD may precede the personality changes. Otherwise, the personality changes do not emanate from sources other than the traumatic event (e.g., prior psychopathology). Typical features include hostility and mistrust, social withdrawal, feeling empty or hopeless, feeling constantly anxious and threatened, and estrangement.

Adapted from Freddy & Donkervoet (1995)
There is a great deal of similarity between the DSM and ICD systems in regard to the diagnosis of PTSD (Freedy & Donkervoet, 1995). In 1980, the first operational description of PTSD was supplied in the third edition of the DSM (i.e., DSM-III; APA, 1980). According to Saigh (1992) this initial description was determined by the APA's 'Reactive Disorders Committee' when preparing classifications for DSM-III. The members of this committee drew from their own clinical experience and a century of research and literature pertaining to typical mental health consequences originating from exposure to traumatic events (e.g., Shell Shock). Two revisions of PTSD diagnosis have taken place since 1980, the first revision in 1987 (DSM-III-R; APA, 1987) and the most recent revision in 1994 (DSM-IV; see Table 2). However, it should be noted that each of the versions (DSM-III, DSM-III-R, and DSM-IV) of the diagnosis of PTSD have much in common in regard to the core symptoms of reexperiencing of the trauma; avoidance or numbing associated with the trauma; and physiological arousal to cues that remind the individual of the traumatic event (Freedy & Donkervoet, 1995). Further, Freedy and Donkervoet (1995) noted that the DSM-IV PTSD criteria are concordant with the ICD-10 definition of PTSD.

Blanchard and Hickling (1997) commented that not all survivors of MVAs present identically and, therefore, suggested it may be more appropriate to conceptualise PTSD, following a MVA, as consisting of four interrelated groups of symptoms and clinical problems. They presented the following four symptom clusters in contrast to the three-cluster classification designated by DSM-IV. The four clusters suggested by Blanchard & Hickling (1997) are, (a) reexperiencing, (b) avoidance, (c) psychic numbing, and (d) hyperarousal. They divided avoidance and psychic numbing, unlike DSM-IV which classifies these symptoms under one cluster. They noted that the rationale behind their classification structure will enable the clinician to determine well-defined treatment interventions that will be better customised to each accident victim. Blanchard and Hickling (1997) proposed that this will aid in defining a purpose for each intervention and logic for its application to MVA survivors with PTSD.
Table 2. *Diagnostic & Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* Criteria for PTSD

**Criterion A** *Both of the following were present:*

1) Person has been exposed to, experienced, witnessed, or was faced with an event that involved actual or threatened death or serious injury (or a threat to the physical integrity of others)
2) Further, the person's reaction involved intense fear, helplessness, or horror (in children may be expressed by agitated or disorganised behaviour)

**Criterion B** *Traumatic event is reexperienced in one, or more, of the following ways:*

1) Recurrent or intrusive distressing recollections, such as images or thoughts may occur (in children, repetitive play may take place in which themes of the event are expressed)
2) Recurrent distressing dreams of the events may occur (in children may be frightening without identifiable content)
3) Acting or feeling as if the traumatic event is recurring, such as flashbacks or hallucinations (in children, the event, or parts of it, may be re-enacted)
4) Intense psychological distress to exposure to internal or external reminders of the traumatic event may occur
5) Physiological reactivity to exposure to internal or external reminders of the traumatic event may occur

**Criterion C** *Three, or more, avoidance or numbing symptoms associated with the trauma must be present:*

1) Efforts to avoid thoughts, feelings, or conversations related to the trauma
2) Efforts to avoid activities, people, or places associated with the trauma
3) Inability to recall important parts of the trauma
4) Significantly diminished participation or interest in important activities
5) Feelings of detachment or estrangement from others
6) Limited range of affect (emotion)
7) Sense of a foreshortened future (e.g., does not expect to live long)

**Criterion D** *Two, or more, increased arousal symptoms must be present:*

1) Difficulty falling or staying asleep
2) Irritability or angry outbursts
3) Difficulty concentrating
4) Hypervigilance
5) Exaggerated startle response

**Criterion E** *Symptoms must be present for at least one month*

**Criterion F** *The disturbance leads to clinically significant distress/impairment in occupational, social, or other important areas of functioning*

Note, *PTSD can be further specified as: Acute (less than three months duration); Chronic (duration for more than three months); and With Delayed Onset (onset at least six months after the traumatic event).*

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Adapted from *DSM-IV* (American Psychiatric Association, 1994).
1.4 CLINICAL PRESENTATION OF PTSD SYMPTOM CLUSTERS IN MVA VICTIMS

1.4.1 Reexperiencing
A key characteristic of PTSD is the occurrence of intrusive thoughts, recollections and dreams of the crash. This is perhaps demonstrated best by dissociative or flashback experiences or distress when the individual is exposed to conditions that correspond with the crash (trauma) or some specific aspect of the MVA. Examples of situations that may cause this to occur are: exposure to driving experiences; riding as a passenger; and watching television news or reading newspaper reports about MVAs. In addition, Taylor and Koch (1995) remarked that reexperiencing symptoms in MVA-related PTSD are characterised by illusions in which cars appear nearer than they are in reality: as a consequence of this, the MVA PTSD-affected individual may believe that they are on the threshold of a collision. Therefore, if the individual is seeking treatment, the clinician needs to be cautious with this symptom because if he or she warns the client that they may experience recollections, the client may avoid situations that remind them of the trauma, therefore, increasing avoidance behaviour. Conversely, not warning the client may lead to future distress if reexperiencing occurs (Burstein, 1989). In addition, MVA PTSD-affected individuals may be vulnerable to future danger from another MVA if they experience a flashback while they are driving (Burstein, 1989).

Bryant (1996) noted that the literature on PTSD flashbacks supports the concept that flashbacks have their origin in cognitive representations formed at the time of the accident. Additionally, research by Bryant revealed that individuals may generate cognitive representations of the trauma after the actual event. Bryant proposed that the stage at which cognitive representations develop have been found to be influential in the post-traumatic response. He suggested that individuals who develop cognitive representations late in the course of recovery are more likely to develop post-traumatic difficulties. Furthermore, post-traumatic intrusive imagery may not reflect the truth about the event. These pseudomemories tend to be strongly linked to the client’s emotional needs. For example, Bryant described the case of a man who developed pseudomemories about his accident that caused him to visualise his
children dead in a wrecked car; however, his children were not involved in his car accident. Consequently, the man did not want to drive again as he believed he would kill his children in a MVA. Bryant viewed this client's pseudomemories as instrumental in maintaining his driving avoidance behaviour. Certainly, the symptom of reexperiencing requires further research into how it influences the development of and, potentially, the treatment of PTSD.

1.4.2 Avoidance
Avoidance following a MVA may manifest in a number of ways. The individual may drive with excessive caution (e.g., driving extremely slowly on busy roads); they may avoid pleasure trips or avoid driving under certain conditions (e.g., in the rain or at night); or they may use techniques to distract themselves if they are a passenger (e.g., closing their eyes if another vehicle is passing) (Taylor & Koch, 1995). Further, it has been commonly reported that MVA victims also tend to avoid the site of their accident (Mayou, Bryant, & Duthie, 1993). In addition, avoidance strategies may be less obvious, for example, cautioning or directing the driver (Taylor & Koch, 1995). Further, the individual affected by MVA-related PTSD may engage in cognitive avoidance by avoiding thoughts that are remindful of the accident. Lastly, Bryant and Harvey (1995a) made the important observation that avoidance behaviour may also deter individuals from taking part in research and/or from seeking treatment.

1.4.3 Psychic Numbing & Estrangement Symptoms
Symptoms of psychic numbing and estrangement are the least studied and understood cluster of symptoms that feature in PTSD, according to Blanchard and Hickling (1997; Hickling & Blanchard, 1999). It is believed that these symptoms might represent a selective emotional-processing deficit. That is, numbing can be viewed as avoidance behaviour directed at attempting to suppress any strong affect because it has become perceived as dangerous and as a reminder of the MVA. Some manifestations of psychic numbing are as follows: inability to recall an important aspect of the trauma; significantly decreased interest or participation in activities; feelings of detachment or estrangement from others; restricted range of emotion (e.g., inability to have loving feelings); and a sense of foreshortened future. Blanchard and Hickling (1997) pointed out that some of the symptoms found in this cluster closely
resemble those found with depression, for example: feelings of sadness, emptiness, and worthlessness; recurrent thoughts of death; irritability and decreased concentration; and symptoms causing impairment in social, occupational, or other areas of functioning.

1.4.4 Hyperarousal

Individuals with PTSD present with hyperarousal symptoms, both in general and for specific situations remindful of their MVA. These symptoms are persistent symptoms of anxiety or increased arousal that were not in existence prior to the accident. These symptoms may include the following: the MVA victim may have difficulty falling or staying asleep, which could be related to frequent nightmares about the accident during which the individual relives the trauma. The individual may be irritable, have outbursts of anger, or have difficulty concentrating. They may also have an exaggerated startle response. Lastly, the MVA victim may be hypervigilant. That is, they may be scanning excessively for any type of threat. Therefore, MVA victims may be continually watchful for any subjective indication of another accident. Harvey, Bryant, and Rapee (1996) noted that individuals with PTSD may have an attentional bias toward threatening material and that this is reflected in hypervigilance. Consequently, it could be suggested that a MVA survivor with PTSD might be continually plagued with the urge to listen out for the sound of a motor vehicle or any other related stimuli.

1.5 ACCIDENT PHOBIA

Several terms have been used to define MVA-related phobias, such as driving phobia and travel phobia; however, the recommended term is accident phobia (Taylor & Koch, 1995). It appears that PTSD occurs on a continuum that has accident phobia at one end and clear-cut PTSD at the other. Kuch, Cox, and Direnfeld (1995) view accident phobia as a subsyndromal PTSD (termed “partial PTSD”). That is, accident phobia is the presence of a specific phobia and the presence of PTSD symptoms from DSM-IV clusters B and C (e.g., intense distress during exposure and avoidance of situations suggestive of the MVA). Note, there is no presence of reexperiencing symptoms. However, there is some confusion with the term subsyndromal PTSD (Kuch et al., 1995). Blanchard and Hickling (1997) did not view subsyndromal PTSD
as accident phobia. They stated that subsyndromal PTSD requires Criterion B (reexperiencing symptoms) and either Criterion C (avoidance or and psychic numbing) or Criterion D (hyperarousal), but not both C and D. This difficulty with terminology contributes to confusion when determining a description of accident phobia.

Nonetheless, Blanchard and Hickling (1997) noted that, "The differential diagnosis between accident phobia and PTSD is important for several reasons, perhaps the most central of which is to establish a model on which to base treatment" (p. 222). According to Kuch, Evans, Watson, Bubela, and Cox (1991), accident phobia is distinguished by three features: (a) DSM-IV diagnostic criteria for specific phobia, (b) onset and content of the phobia are related to an accident, and (c) anxiety symptoms and avoidance behaviour centre around excessive fears of repetition of the accident. Furthermore, exposure to MVA-related stimuli is not only fear eliciting; it may incite or exacerbate tension headache, myalgia, or gastrointestinal discomfort, and may induce panic attacks.

1.6 DELAYED-ONSET PTSD
According to Blanchard and Hickling (1997), delayed-onset is a well recognised occurrence in PTSD; however, they also noted that there is sparse literature on this phenomenon. DSM-IV (APA, 1994) officially classified this aspect as a subcategory of PTSD for which there is a delay of at least six months between when the trauma occurred and the individual meeting the full criteria for the disorder. McFarlane (1988) found that 62 (19.7%) out of 315 Australian firefighters suffering from trauma developed delayed PTSD. Buckley, Blanchard, and Hickling (1996) found that 7% of a MVA sample developed PTSD during a one-year prospective follow-up, after an initial one to four months post-MVA assessment. The average onset time for this group was eight and a half months. Green, McFarlane, Hunter, and Griggs (1993) in a study of 24 Australian MVA survivors, hospitalised for injury, found that only one survivor meet the criteria for PTSD at the one-month follow-up. However, at the eighteen-month follow-up five more cases of PTSD had developed.
Blanchard and Hickling (1997) pointed out that the reasons for delayed PTSD onset are unclear. Nevertheless, they believed that at the time of the MVA that at least some symptoms of PTSD are present in those who develop delayed-onset. Moreover, they stated, “We believe a clinician can be fairly confident that an individual who escapes the trauma of a MVA without developing at least subsyndromal PTSD is extremely unlikely to develop PTSD later” (p. 154). Buckley et al. (1996) believed that it may be an early avoidance of thoughts or stimuli implicative of the MVA that may be an indicator of those who may develop delayed-onset PTSD, however, this may be very difficult to detect because avoidance, if severe enough, can “self-cloak” the symptoms of PTSD. Consequently, if the MVA survivor is being assessed the clinician must exercise caution during assessment following the accident as intense avoidance symptoms may generate false negatives.

Buckley et al. (1996) believed that another contributor to delayed-onset PTSD is that the MVA survivor has more negative life events following the MVA than those MVA survivors who do not develop PTSD. Buckley et al. (1996) found that delayed MVA-related PTSD sufferers had lower perceived social support than sample controls. Accordingly, Blanchard and Hickling (1997) noted a record of poorer pre-MVA family relationships for the same sample (see Buckley et al., 1996) and that those who developed delay-onset had been functioning less well prior to the MVA. Blanchard and Hickling (1997) argued that MVA survivors who are moderately symptomatic, but do not meet the criteria for PTSD, are at risk for delayed-onset PTSD. This is more probable if they have a poor family relationship history (low social support) and if they were not functioning well before the accident. Ehlers, Mayou, and Bryant (1998), based on a large MVA survivor sample, reported that the following variables were predictive of delayed-onset of PTSD between three months and one year post-accident: Injury severity, persistent medical difficulties, financial difficulties, anger cognitions, rumination, and negative interpretations of thought suppressions and intrusions.

As discussed previously, Green et al. (1993) found that five cases of MVA-related PTSD had been formerly undiagnosed (i.e., at the time of the trauma). This highlights a potential difficulty with PTSD, that is, the issue of overlooked and undiagnosed
PTSD. However, there is an inherent problem in estimating the prevalence of undiagnosed PTSD, in that individuals' reluctance to participate in any research, due to avoidance, may substantially lower estimates (Green et al., 1993). Thus, the outcome of undiagnosed PTSD on those afflicted with it is unclear (Green et al., 1993). However, Green et al. (1993) noted that PTSD does contribute to functional outcome and social adaptation; consequently, it could be suggested that those left untreated would suffer extreme adversity in these areas. In conclusion, Green et al. (1993) commented that it must be in the interest of the accident victims and the community at large to provide these individuals with early treatment in order to reduce long-term morbidity.

Lastly, Smith (1989) noted that other delayed psychological reactions, as well as PTSD, can occur in MVA victims. Smith (1989) reported that these reactions tend to be insidious rather than acute and that the reaction is an adverse secondary adaptation to the conditions produced by the accident and/or its subsequent injuries. Contributing factors are accident-related physical limitations, pain and susceptibility, new social and family stressors, financial concerns, a different perception of the work environment, and the medicolegal circumstances of compensation and treatment. Smith (1989) remarked that these factors may lead to continual psychological problems in a substantial number of road accident victims. According to Smith (1989), the most frequent symptoms are depression, reactive somatoform disturbances, hostility, and chronic and generalised anxiety.

1.7 PSEUDO-PTSD

According to Lees-Haley (1986), during the recovery from an accident a MVA survivor may conclude that all of his or her troubles are accident related. However, unlike actual PTSD, pseudo-PTSD is produced by circumstances and actions unrelated to, and not initiating from, the original trauma. Symptoms similar to those of PTSD are often produced as by-products of personal habits, daily life experiences, and iatrogenically (i.e., stemming from health care treatment). Lees-Haley (1986) gave the following scenario as an example of the progression of pseudo-PTSD:
1) A genuine trauma occurs which may lead to pain, anxiety, and depression.

2) The individual receives medication, for example, pain medication, tranquilizers, and anti-depressants.

3) During treatment the patient develops hysterical or hypochondriacal reactions to real or imagined problems, which may be confounded by drug treatment.

4) Symptoms unrelated to the trauma emerge as a consequence of other life experiences.

5) The patient learns about PTSD through interactions with relatives, lawyers, friends, health care providers, and other sources (e.g., magazines). This knowledge biases the patient’s perception of their symptoms and interpretation of other, unrelated experiences.

Lees-Haley (1986) stated that it is important to remember that the individual believes they have PTSD and this can increase the chance of erroneous diagnosis of PTSD. He further added that pseudo-PTSD can be detected through careful examination of the individual’s history and treatment records.

1.8 OTHER DIAGNOSES & COMORBIDITY

MVA survivors can display a widespread range of clinical problems, including accident phobia, driving reluctance, full or partial PTSD, depression, anxiety, chronic pain, conversion disorder, and neuropsychological impairments (Błaszczyński et al., 1998; Kuch et al., 1991; Shipherd, Beck, Hamblen, & Freeman, 2000; Taylor & Koch, 1995). Koren, Arnon, and Klien (1999) reported that 67% of their road accident sample who had PTSD also had a coexisting psychiatric diagnosis (i.e., affective or anxiety disorder). Conversely, only 18% of the non-PTSD road accident victims experienced a co-occurring psychiatric diagnosis (i.e., affective or anxiety disorder). Maes, Mylle, Delmeire, and Altamura (2000) reported, based on their mixed road accident trauma and fire trauma sample, the following new-onset disorders: PTSD (45.9%), depression (13.4%), general anxiety disorder (12.6%), agoraphobia (10.2%), psychoactive substance use disorder (6%), simple phobia (1.9%), panic disorder (1.7%), and obsessive compulsive disorder (1.1%). Further, Maes et al. (2000) found that 51% of those with PTSD had a comorbid diagnosis, the most common being major depression, agoraphobia, and generalized anxiety disorder.
Before focusing on comorbidity and other diagnoses that may follow involvement in a road accident, the diagnosis of Acute Stress Disorder (ASD) needs to be addressed. As this diagnosis is relevant to the month immediately following the accident, it is not pertinent to the assessment of participants in the studies in this thesis (due to using an evaluation time frame beginning at least one month post-accident). Nonetheless, the importance of this diagnosis in the MVA field should not be overlooked.

Hobbs and Mayou (2000) remarked that while emotional shock is a common and appropriate reaction to a terrifying accident, the acute impact of road accidents has received little exploration. However, they reported that the diagnosis of ASD was introduced in the *DSM-IV* in 1994 (APA, 1994). Most of the research of ASD in road accident literature is credited to the researchers Harvey and Bryant (1998a, 1998b, 1999a, 1999b, 1999c; Bryant, Harvey, Guthrie, & Moulds, 2000). ASD occurs after a fearful reaction to experiencing or witnessing a threatening event (Harvey & Bryant, 1998b). The necessary symptoms include three dissociative symptoms (i.e., numbing, reduced awareness, derealisation, depersonalisation, and dissociative amnesia), as well as one reexperiencing symptom, one marked avoidance symptom, one marked anxiety or increased arousal symptom, and evidence of significant distress or impairment (APA, 1994; Harvey & Bryant, 1998b, 1999a). Further, the disturbance lasts a minimum of two days and a maximum of four weeks and transpires within four weeks of the traumatic event (APA, 1994). After this period, a diagnosis of PTSD should be considered (Harvey & Bryant, 1998b). According to Harvey and Bryant (1998b) the principal difference between ASD and PTSD, is the emphasis on dissociative responses in ASD.

Harvey and Bryant (1998b) found a rate of 13% of ASD and 21% of subclinical ASD (i.e., meet all but one cluster of the *DSM-IV* diagnosis) in a MVA sample (n = 92). Importantly, they noted that 78% of the initial ASD individuals and 60% of the subclinical individuals met a diagnosis of PTSD at six months. At two years, Harvey and Bryant (1999c) reported that 63% of the initial ASD individuals and 70% of the initial subclinical individuals met a PTSD diagnosis. Further, it was found that 13% of the initial sample who did not meet ASD diagnosis did, however, meet a PTSD diagnosis at two years post-accident (Harvey & Bryant, 1999c). They found that emotional numbing and emotional depersonalisation had reasonably strong predictive...
power for subsequent PTSD, in contrast to other dissociative symptoms (Bryant & Harvey 1999; Harvey & Bryant 1998b). They added that in regard to nondissociative ASD predictors of PTSD, that the symptoms of a sense of reliving the accident and motor restlessness were strong indicators (Bryant & Harvey, 1999; Harvey & Bryant 1999c).

Bryant and Harvey (1999) thus concluded that their various studies provide limited support for the diagnosis of ASD, in regard to its role as a precursor of PTSD, because a significant number of those who initially meet an ASD diagnosis subsequently experienced persistent PTSD. Nonetheless, they cautioned that the current emphasis on dissociative symptoms does not appear warranted as a number of those who presented with subclinical ASD (i.e., lacked dissociative symptoms) also went on to develop PTSD. Consequently, they stated that their early research indicated that there are multiple pathways to PTSD, and these pathways may or may not entail acute dissociation (Bryant & Harvey, 1999; Harvey & Bryant 1999c).

In regard to other diagnoses, accident phobia appears to be a reasonably common comorbid diagnosis with MVA-related PTSD (Hickling & Blanchard, 1997). Kuch, Swinson, and Kirby (1985) defined driving phobia (accident phobia) "...as avoidance or reduction in driving, or endurance of driving with marked discomfort" (p. 426). The difficulty with accident phobia is that DSM-IV states that PTSD cannot be diagnosed when the individual meets the criteria for a simple or specific phobia (Blanchard & Hickling, 1997). However, Blanchard and Hickling (1997) noted that a hallmark of PTSD is that the individual should be fearful and avoidant of the situation that was life threatening and traumatic. Further, Hobbs and Mayou (2000) noted that phobic travel anxiety overlaps with PTSD. Consequently, it would appear that the DSM-IV stipulation is perhaps contradictory in some cases of MVA-related PTSD.

Kuch et al. (1985) found that 77% of a group of MVA-related PTSD sufferers had an accident phobia (driving phobia). Hickling and Blanchard (1992) determined that 92% of their MVA-related PTSD victims also had an accident phobia (according to their earlier defined classification). However, in a later study Blanchard et al. (1994a) found that only one out of 50 subjects exhibited an accident phobia. Nonetheless, the
researchers noted that many of their subjects did have some degree of driving fear or avoidance. Taylor and Koch (1995) believed that there may be an under diagnoses of accident phobia due to excessively restrictive criteria for this condition. Further, according to Hobbs and Mayou (2000), phobic anxiety is frequently most acute in travelling conditions that are similar to the accident (e.g., those who were cyclists most concerned when cycling, those who were drivers most concerned when driving). However, they noted that there is noticeable generalization in many individuals. Further, Shipherd et al. (2000) noted that many drivers following a road accident (with and without PTSD) may avoid driving in some manner. They noted this avoidance might be subtle, for example avoiding the accident scene, or generalized, for example, refusing to drive on any busy roads. In addition, Mayou (1999) reported, concerning travel anxiety, “Not only does it [travel anxiety] affect vehicle drivers and passengers, it is just as common amongst cyclist and pedestrian accident victims” (p. 49).

Chronic pain (e.g., headache, back pain) is another common comorbid diagnosis (Kuch et al., 1995). In a chronic pain sample, phobias and PTSD were three times more frequent in MVA survivors than in individuals with a nonvehicular onset of pain (Kuch et al., 1991). A study by Blanchard et al. (1994a) found that the pervasiveness of PTSD or subsyndromal PTSD (accident phobia) was close to 40% or more in four samples of individuals with chronic pain symptoms. Headache is a frequent symptom found with whiplash injury and estimates of post-traumatic headache following a MVA varies from 28% to 100% of survivors (Hickling, Blanchard, Silverman, & Schwarz, 1995). Kuch et al. (1996) commented that patients with comorbid muscle contraction headache are sensitive to stressful stimuli which could exacerbate PTSD symptoms. Overall, Blanchard and Hickling (1997) noted that the presence of a chronic physical problem may contribute to the continuance of PTSD. Further, pain or change in lifestyle may unfavourably interact with the subsequent emotional adjustment to the MVA; in other words, physical and emotional factors have the ability to be very powerful and may be one of the inherent variables for chronic PTSD (Blanchard & Hickling, 1997).

Major depression is another common comorbid diagnosis with MVA-related PTSD (Harvey et al., 1996; Taylor & Koch, 1995; Blanchard & Hickling, 1997). Blanchard
and Hickling (1997) estimated that major depression may be as high as 53% in MVA survivors with PTSD. Blaszczynski et al. (1998), in a review of the literature, reported that depression is a significant feature in MVA survivors, found in one fifth to two thirds of this population. Further, mood disorder may enhance the impact of myofacial pain on daily activities and the self-perceived disability connected with headache; notably, comorbid pain disorder, depression, and PTSD could potentially impede treatment gains (Kuch et al., 1996). Blanchard et al. (1994a) pointed out that there is a substantial symptom overlap between depression and PTSD. They share symptoms of: sleep disturbance, anhedonia, and difficulty concentrating. Maes et al. (2000) found that MVA and fire trauma survivors with comorbid PTSD and major depression, or any anxiety disorder, experienced more clinical distress and presented with severer symptoms of PTSD than those with one of these disorders only.

Blaszczynski et al. (1998), in a review of the literature, noted that anxiety is frequently found in up to 87% of MVA survivors. However, they do point out that rates as low as 4% have been reported. Bryant and Harvey (1995a) noted that other anxiety disorders are a common comorbid diagnosis with PTSD; further, that it is possible that PTSD with or without other anxiety disorders or depression may differ in regard to their respective predictors. Blanchard and Hickling (1997) found that MVA survivors with PTSD, in contrast to those who do not have PTSD, tend to have a higher rate of current panic disorder (6.5% vs. 1%). In addition, other studies (Breslau, Davis, Andreski, & Peterson, 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) have revealed significant levels of comorbid anxiety disorders (e.g., generalized anxiety disorder, simple phobia, social phobia, obsessive compulsive disorder, and agoraphobia). Research by Kessler et al. (1995) on PTSD and comorbidity, revealed that anxiety disorders were consistently higher in those with PTSD than in those without it. For example, 16.8% of those with PTSD had generalized anxiety disorder, whereas, only 3.3% of those without PTSD had generalized anxiety disorders. Shipherd et al. (2000) reported that some road accident survivors experience claustrophobic-type fears that are due to situations such as being strapped to a backboard directly following their accident.

Alcohol and substance abuse are two other conditions that require acknowledgement. Breslau et al. (1991) found substance abuse and dependence among their study
subjects with PTSD at 43%, in contrast, those without PTSD at 24%. Conversely, Blanchard and Hickling (1997) noted that current alcohol or drug abuse and dependence was no higher in their sample for MVA-related PTSD in comparison to non-PTSD MVA victims. However, they admitted that this low figure may be due to an unavoidable recruitment bias. That is, individuals who were heavily involved in misusing substances at the time of their MVA may be unlikely to come forward for research due to possible legal prosecution (Blanchard & Hickling, 1997).

Of note, Shipherd et al. (2000) reported that in their own work (Shipherd, Beck, Hamblen, & Freeman) they have found comparatively high rates of comorbid depression, generalised anxiety disorder, and specific phobias of enclosed spaces (claustrophobia). They reported that in a number of individuals these comorbid conditions make “intuitive sense”. They give the example of accident survivors expressing thoughts of being a burden to their family and feelings of guilt because “a stronger person would be over this by now” (p. 138). Consequently, these individuals frequently experience social isolation and depressed affect. Further, Shipherd et al. (2000) noted that lifestyle adjustments (e.g., loss of employment) appear to add to elevated levels of generalised anxiety by promoting concerns about family functioning, money, and so forth.

Lastly, Hobbs and Mayou (2000) related that there are a number of psychiatric consequences that may follow involvement in a road accident, many of which have been discussed above. However, they pointed out, “A tendency in the literature and also in clinical practice to focus discussion of assessment and services on PTSD should not obscure the clinical significance of a wider range of consequences and also the importance of subthreshold distress” (p. 148). Further, Briere (2001) stated, “PTSD is probably a spectrum response. There is no data to suggest that those who almost have PTSD are suffering any less than those with PTSD.” The author fully endorses these views and notes that while this review focuses mainly on PTSD, that this in no way should discount the importance of other psychological reactions to MVAs that occur with or without PTSD, or reactions that do not completely satisfy a DSM-IV diagnosis (i.e., subclinical syndromes).
1.9 ASSESSMENT OF MVA-RELATED PTSD & DISTRESS

Most of what is known about a comprehensive assessment of PTSD stems from the crime or combat-related trauma literature (Best & Ribbe, 1995). Drawing on this literature, Best and Ribbe (1995) suggested that assessment following accidental injury should range from recording trauma histories, to structured interviews (e.g., Clinician Administered PTSD Scale, CAPS; Blake et al., 1990) to standardised PTSD questionnaires (e.g., Impact of Event Scale, IES; Horowitz, Wilner, & Alvarez, 1979) to standard evaluation of co-morbid conditions such as anxiety or depression, and, lastly, to psychophysiological reactivity to trauma related stimuli. Further, Best and Ribbe (1995) noted that the number of instruments that can be used will be dependent on the characteristics of the patient, for example, the patient’s reading ability, their concentration level, and their physical condition.

Whenever possible it is recommended that the therapist employs as many assessment tools as possible. In addition, the assessment procedure should flow from the more unstructured form of instrument (e.g., telling of the trauma experience), to assessment of other traumatic events, to evaluation of PTSD and co-morbid conditions, and if possible end with a psychophysiological assessment (Best & Ribbe, 1995). Lastly, the assessment should be achieved in one lengthy session or completed in two or more shorter sessions, depending on the requirements of the patient and other practical issues.

According to Best and Ribbe (1995), a great deal of information can be gained from asking the patient to describe what happened before, during, and immediately after their accident, how things are different for him or her since the MVA, and how he or she has been changed since the accident. Furthermore, the clinician can obtain content-specific information that can aid in developing individualised treatment plans and that may help the clinician to detect a patient’s coping style. For example, a greatly detailed account may indicate obsessive or intrusive symptomatology; whereas, disseminated and disorganised accounts may imply impaired concentration due to anxiety (Best & Ribbe, 1995).
In addition, the process of telling their story can have therapeutic advantages. These include a cathartic effect for the patient, helping the patient grasp that the therapist views them as an individual and wants to understand their experience, and imparting to the patient that it is acceptable for them to talk about their MVA and its emotional impact (especially if others have tried to suppress this expression). It is recommended that the patient's relaying of their story occurs in the first session before any other assessment tests (Best & Ribbe, 1995). Blanchard and Hickling (1997) have developed a structured interview, the MVA Interview, that follows the above reasoning and aims to elicit a patient's subjective reactions to their MVA.

Apart from the use of standardised psychometric questionnaires in the evaluation of trauma (e.g., IES) and comorbid conditions, the Accident Fear Questionnaire (AFQ; Kuch et al., 1996) may be useful in the assessment of MVA-related PTSD. This questionnaire is used to discriminate between PTSD, accident phobia, and non-PTSD diagnosis (Kuch et al., 1996). Individuals are asked to answer "yes" or "no" to a number of questions relating to the MVA. Examples of these questions include: "During the accident did you fear for your life?"; "Do you have nightmares about your accident?"; and "Do you expect another accident soon?". An additional section to the questionnaire involves the MVA survivor rating their avoidance behaviour on a 0 to 8 scale (zero = "Would not avoid it", 3 = "Would sometimes avoid it", and 8 = "Would always avoid it"). Some examples of the issues addressed in the avoidance section include: Driving alone or being a passenger, driving on certain roads, riding with a specific driver, and seeing wounds and injuries. Responses to items on the AFQ may indicate particular areas of distress and provide the clinician with information in regard to the issues that need to be addressed in therapy.

Psychophysiological assessment, as noted by Best and Ribbe (1995), is another potentially important part of a MVA's survivor's evaluation. One of the three symptom clusters of PTSD defined by DSM-IV is increased arousal (Best & Ribbe, 1995). An effective method of assessing heightened arousal among trauma victims is psychophysiological responsiveness to trauma-related stimuli (Blanchard, Hickling, & Taylor, 1991; Blanchard, Hickling, Taylor, Loos, & Gerardi, 1994b; Blanchard, Hickling, Buckley, et al., 1996). It has been reasonably well established (Blanchard,
Hickling, Buckley, et al., 1996) that psychophysiological responses, particularly heart rate and electrodermal activity (other responses are blood pressure and increased muscle tension) to cues reminiscent of a MVA, are useful in the assessment of PTSD.

Research has shown that heart rate changes to idiosyncratic audio taped descriptions of the MVA survivor’s own accident reliably discriminated those MVA survivors with full PTSD from those with subsyndromal PTSD (Blanchard, Hickling, Buckley, et al., 1996). Furthermore, high levels of physiological reactivity may continue for up to four years (Best & Ribbe, 1995). Blanchard and Hickling (1997) believed that psychophysiological assessment performed one to four months after an accident can be used to diagnose PTSD and suggest that this data may also predict how the individual will function in twelve months time (i.e., certain heart rate activity has been correlated with the presence of PTSD a year later). Although psychophysiological evaluation may generate valuable information, its use is specialised and may not be appropriate for most clinical office settings (Best & Ribbe, 1995). Lastly, Blanchard and Hickling (1997) suggested that psychophysiological evaluation could have potential use in the detection of malingering; however, they asserted that a substantial amount of research is required before this can be verified.

Below, are listed a number of measures of post-trauma distress, including those for PTSD. Following the adult measures (sections 1.9.1-1.9.12), a number of measures developed for trauma responses in children and adolescence will be outlined (sections 1.9.12-1.9.20). A number of the measures, discussed below, are used in the two studies of this thesis and are explained in more detail in the appropriate method sections. The descriptions, to follow, are based on reviews by Best and Ribbe (1995), Carlson (1997), and Orsillo (2001):

1.9.1 Clinician-Administered PTSD Scale (CAPS)
The CAPS was designed by Blake et al. (1990) and is a clinician-rated scale taking 45-60 minutes for administration. The CAPS consists of a number of sections that reflect DSM-IV criteria for PTSD. A particular advantage of CAPS over other assessment instruments is that it measures the frequency and intensity for each symptom (Blanchard & Hickling, 1997). Consequently, the CAPS can be used as an
initial measure or as a continuous measure for assessing the severity of symptoms. Importantly, this scale evaluates impairment in the individual’s social and occupational functioning (Blanchard & Hickling, 1997). High interrater reliability and validity has been found with this scale (Best & Ribbe, 1995; Blanchard & Hickling, 1997; Orsillo, 2001).

1.9.2 Davidson Trauma Scale (DTS)
The DTS was devised by Davidson et al. (1997) and is a 17 item self-report measure of DSM-IV PTSD symptoms, requiring 10 minutes administration time. It rates frequency and severity for the past week. It demonstrates moderate to high validity and reliability, and is sensitive to treatment effects (Carlson, 1997; & Orsillo, 2001).

1.9.3 Distressing Event Questionnaire (DEQ)
Designed by Kubany, Leisen, Kaplan, and Kelly (2000), based on DSM-IV PTSD criteria requiring five minutes administration time, although, it does not assess criterion A-I (occurrence of a traumatic event). Limited samples suggest good reliability and validity; however, further psychometric testing is required.

1.9.4 Impact of Event Scale (IES)
The IES, devised by Horowitz et al. (1979) is a 15-item, self-report questionnaire structured to give a cross-sectional picture of subjective psychological responses to a stressful life event. It measures current subjective distress related to a specific event (Horowitz et al., 1979; Zilberg, Weiss, & Horowitz, 1982). The IES assesses the frequency of symptoms occurring within seven days of administration. Respondents rate how true the items are for them on a 4-point scale. This scale comprises of; “not at all” (scored 0), “rarely” (scored 1), “sometimes” (scored 3), and “often” (scored 5). The IES gives scores for both avoidance and intrusion symptoms, and an overall score. Due to the conciseness of the IES, it is good for the initial assessment of PTSD and for the monitoring of PTSD symptoms during the course of treatment (Best & Ribbe, 1995). The IES has continually demonstrated moderate to high reliability and validity, and has been significantly associated with levels of general distress (Orsillo, 2001). Orsillo (2001) noted the IES has been widely used to measure PTSD but cautions it does not assess hyperarousal symptoms. A revised version (IES-R),
including hyperarousal symptoms has been developed but needs to be empirically evaluated (Orsillo, 2001).

1.9.5 Los Angeles Symptoms Checklist (LASC)
Developed by King, King, Leskin, and Foy (1995), the LASQ is a 43-item, self-report measure based on DSM-IV PTSD criteria requiring 10-15 minutes administration time. It also provides a global assessment of distress and interference associated with the traumatic event. It has no set time frame in regard to symptom presence. It has demonstrated moderate validity and high reliability (Orsillo, 2001).

1.9.6 Minnesota Multiphasic Personality Inventory PTSD Scale (MMPI-PTSD)
Developed by Keane, Malloy, and Fairbank (1984), this scale usually can be administered as part of the full MMPI-2 or a stand-alone scale, taking 15 minutes administration time for the stand-alone version. The MMPI-PTSD received excellent reliability in veteran samples and moderate to high validity in a number of trauma samples. It has demonstrated treatment sensitivity (Orsillo, 2001).

1.9.7 Mississippi Scale for PTSD
A scale designed by Keane, Caddell, and Taylor (1988) that has several versions associated with DSM-IV criteria for PTSD, including a combat-related scale (35 – item) and a civilian scale (35 – 39 items; two versions). Administration time required is 10-15 minutes. It rates symptoms for the time period since the event. Reliability for both scales has been reported as very good to excellent. Validity for the scales is variable, the combat scale has been found to be significantly associated with combat exposure (Orsillo, 2001). On the civilian scale, individuals with symptoms of PTSD scored significantly higher than those without PTSD symptoms and the civilian version has been noted to be strongly associated with general distress, depression, and anxiety (Orsillo, 2001).

1.9.8 Penn Inventory for PTSD (Penn Inventory)
Developed by Hammarberg (1992), the Penn Inventory is a 26-item, self-report measure of the severity of PTSD taking 10-15 minutes administration time. It assesses
PTSD symptoms over the past week. The Penn Inventory has demonstrated very good to excellent reliability (Orsillo, 2001). Its validity has also received strong support (Carlson, 1997; Orsillo, 2001) and it has been found to be sensitive to treatment effects.

1.9.9 Posttraumatic Diagnostic Scale (PDS)
Developed by Foa, Cashman, Jaycox, and Perry (1997) to assess DSM-IV diagnostic criteria of PTSD. It is a 49-item, self-report scale that takes 10-15 minutes to complete and assesses symptoms over the past month. The PDS has shown good to excellent reliability, and satisfactory to good validity (Orsillo, 2001). Orsillo (2001) suggested that the PDS may be more of a measure of psychological distress rather than PTSD.

1.9.10 PTSD Checklist (PCL)
Originally cited by Weathers, Litz, Hermann, Huska, and Keane (1993), the PCL is a 17-item inventory that assesses symptoms for the past week, it requires 10 minutes to administer. It is based on DSM-IV diagnostic criteria but caution should be exercised (Orsillo, 2001). A number of versions exist including a military version. Shown to have excellent reliability with variable validity, particularly in regard to diagnostic cut-off scores (Orsillo, 2001).

1.9.11 Structured Interview for PTSD (SIP)
Original version developed by Davidson, Smith, and Kudler (1989) to assess PTSD symptom severity over the past four weeks. Like most other measures, it is based on DSM criteria for PTSD and needs 10-30 minutes to administer. It also evaluates survivor guilt. It has demonstrated moderate to high reliability and validity (Carlson, 1997; Orsillo, 2001). It has shown a diagnostic efficiency of 94% and treatment sensitivity (Orsillo, 2001).

1.9.12 Trauma Symptom Inventory (TSI)
The TSI was developed by Briere (1995) to evaluate acute and chronic posttraumatic symptomatology. It is a 100-item self-report measure that takes approximately 20 minutes to complete. The TSI comprises three validity scales and 10 clinical scales. The scales include; anxious arousal, depression, anger/irritability, intrusive
experiences, defensive avoidance, dissociation, sexual concerns, dysfunctional sexual behavior, impaired self-reference, and tension reduction behavior. The TSI evaluates symptoms over the past six months. The TSI has demonstrated very good to excellent internal consistency, for the individual scales, and high validity (Orsillo, 2001).

1.9.13 Children’s PTSD Inventory (CPTSDI)
Developed by Saigh (1998), the CPTSDI is a structured interview based on DSM-IV criteria for PTSD. This instrument generates five diagnoses; PTSD Negative, Acute PTSD, Chronic PTSD, Delayed Onset PTSD, and No Diagnosis (i.e., when examinee has been exposed to an extreme form of stress but does not acknowledge it). The CPTSDI has been reported to have acceptable psychometric properties in the moderate to high range (Yasik et al., in press).

1.9.14 Childhood PTSD Interview (CPTSDI)-Child Form
Developed by Fletcher (1996d), this a structured interview to ascertain a PTSD diagnosis in children and adolescents (no age specified). The CPTSDI takes approximately 30-45 minutes to administer and assesses a number of trauma related symptoms including DSM (III-R & IV) criteria. Moderate to high validity and reliability has been reported and empirical research is ongoing. A parallel parent form is available (Childhood PTSD Interview-Parent Form, Fletcher (1996d)).

1.9.15 Clinician-Administered PTSD Scale for Children and Adolescents for DSM-IV (CAPS-CA)
Developed by Nader and associates (Newman & Ribbe, 1996), this interview assesses DSM-IV PTSD symptoms over the past week for 7-18 year olds. It is noted as an extremely thorough measure; however, it takes a longer time to administer than other measures (30-120 minutes). As well as DSM criteria, it also assesses survivor guilt, shame, and a number of other trauma related symptoms. The CAPS-CA is undergoing further empirical research (Newman & Ribbe, 1996).

1.9.16 Dimensions of Stressful Events (DOSE)
Developed by Fletcher (1996b), the DOSE is a 25-item checklist that gathers qualitative information about traumatic events experienced by children. Aspects of the
traumatic event that are assessed include source of the event, sense of control, and preparedness for the event. The DOSE is completed from information gained from the child, other informants, and the clinician/researcher (15-30 minutes administration time). There are also 24 additional items available for assessment of sexual abuse. Evidence of validity has been noted but it needs further psychometric evaluation (Carlson, 1997).

1.9.17 Parent Report of the Child’s Reaction to Stress
Constructed by Fletcher (1991), this instrument is a pencil-and-paper report, completed by the parents, on their child’s reaction to a traumatic experience. This report allows a DSM-IV PTSD diagnosis to be made and generates a severity score. Further, it assesses other trauma related symptoms (e.g., guilt, blame, self-destructive behaviour, etc.). Limited psychometric testing has been reported on this measure; however, research so far indicated evidence of validity and reliability (Fletcher, 1996a).

1.9.18 Posttraumatic Symptom Inventory for Children (PTSIC)
Developed by Eisen and Carlson (1997) as an interview-administered scale for children aged 4-8 years and takes 15-20 minutes to administer. The PTSIC assesses DSM-IV symptoms of PTSD. Evidence of validity and reliability has been noted but further empirical research is required.

1.9.19 Trauma Symptom Checklist for Children (TSCC)
Developed by Briere (1996b), the TSCC measures traumatic symptomatology in 8-16 year olds requiring 10-20 minutes to complete. It is a self-report measure that generates two validity scales and six clinical scales: Anxiety, depression, anger, posttraumatic stress, dissociation, and sexual concerns. It has been found to have moderate to high validity (Carlson, 1997).

1.9.20 When Bad Things Happen Scale (WBTH)
Designed by Fletcher (1996e) as a self-report for children with at least 3rd grade reading level, and takes 10-20 minutes to complete. It assesses DSM (III-R & IV) criteria of PTSD and evaluates a wide range of other trauma related symptoms (e.g.,
anxiety, depression, guilt). It has demonstrated moderate to high reliability and validity but empirical research is ongoing (Fletcher, 1996e).

1.10 CAUSATION OF MVA-RELATED PTSD

There is a range of theoretical models, rooted in psychological and biological paradigms, which serve to provide an explanation for the etiology of PTSD. However, an in-depth discussion of these models is beyond the scope of this thesis (for a detailed explanation of these models see Freedy & Donkervoet, 1995; Saigh, 1992). Nonetheless, a brief overview of some of the key conceptual models of PTSD will be presented below. Consequently, given below is a general approach to PTSD conceptual models, followed by etiological perspectives on MVA-related PTSD.

While the focus of this thesis is predominantly from a psychological standpoint, it is still worth noting the biological concepts of PTSD. Research into the biological factors involved in PTSD has centred on animal models. For example, analyses of animals subjected to inescapable shock, such as seen in the work of van der Kolk, Greenberg, Boyd, and Krystal (1985). These studies of animals may indicate the underlying biological factors found in humans. It is proposed that the incapacity to escape shock may lead to specific biological changes (Freedy & Donkervoet, 1995). Transient depletion of particular neurotransmitters (e.g., norepinephrine, epinephrine, and dopamine) has been found in animals exposed to shock (Freedy & Donkervoet, 1995). According to van der Kolk et al. (1985), the reduction of these neurotransmitters has been shown to generate symptoms that appear equivalent to the negative symptoms of PTSD in humans. These symptoms involve the constriction of affect, a decrease in goal-orientated behaviour, numbing, social withdrawal, and difficulties with occupational functioning. In addition, positive symptoms such as nightmares, startle responses, and intrusive thoughts have been associated with chronic hypersensitivity of norepinephrine receptors parallel to that seen in animals confronted with extensive and unavoidable traumatic conditions (Foy, Osato, Houskamp, & Neumann, 1992).

Furthermore, van der Kolk (1987) also reported that exposing an animal to numerous exposures of inescapable shock leads to the release of endogenous opiates thus
producing a state of analgesia. Therefore, it may be that humans exposed to trauma experience a similar reaction and that the consequent symptoms of PTSD may be the result of withdrawal from excessive noradrenergic activity (Foy et al., 1992). Therefore, over time the endogenous opiates can have an addictive effect on the animal; subsequently, in the absence of the stressor associated with the opiate release, the animal goes through a type of opioid withdrawal (Freedy & Donkervoet, 1995). The PTSD like symptoms correlated with this withdrawal include anxiety, difficulty sleeping, startle responses, hyperalertness, and impulsivity. Additionally, the symptom of reexperiencing the traumatic event would reactivate the production of opiates, which in turn would provide a way to reduce the symptoms of anxiety, hyperalertness, sleep disturbance, and startle response (Foy et al., 1992). Lastly, Freedy and Donkervoet (1995) recounted the argument made by Charney, Deutch, Kyrstal, Southwick, and Davis (1993) that the withdrawal hypothesis can explain the high occurrence of substance abuse among combat veterans with PTSD, thrill-seeking behaviour, and the compulsive reexposure to trauma commonly observed in PTSD populations.

Kolb (1988) proposed the Conditioned Emotional Response Model (CER) as an explanation of PTSD. This model suggests that long-lasting exposure to painful, inescapable threat may lead to a change in the neurological structures within the brain, primarily the limbic system (Freedy & Donkervoet, 1995). Thus, traumatic experiences may lead to an over stimulation of specific areas within the limbic system, especially the locus coeruleus. Consequently, threat leads to an activation of neurons in the locus coeruleus, which is linked to the organism expressing behaviours characteristic of fear and alarm. It is proposed that if pairing of nonthreatening stimuli with threatening stimuli occurs then there will be an overactivation and generalised hyperactivity of the locus coeruleus that in time will lead to a conditioned alarm state that is identified with PTSD (Freedy & Donkervoet, 1995).

Additionally, it has been suggested that post-traumatic adaptation may be associated with an inherited biological predisposition to experience anxiety (Barlow, 1988; Jones & Barlow, 1990). It is argued that people may inherit an autonomic nervous system that has two features. Firstly, a high resting level of heart rate and blood pressure and, secondly, a high rate of reactivity to threatening stimuli. It is suggested that
incapacitating levels of anxiety result due to this predisposed biological vulnerability in amalgamation with an intense or prolonged stressor. Consequently, it may be that the stressor is environmental (e.g., motor vehicle accident) or internal (e.g., thoughts about environmental threats or internal sensations) (Freedy & Donkervoet, 1995).

Further, Freedy and Donkervoet (1995) commented that this model suggests that individual characteristics (e.g., coping responses and family support) may, in combination with biological vulnerability, either elevate or decrease the probability of a stressor leading to heightened levels of anxiety.

While the above biological perspectives offer a number of worthy explanations about the etiology of PTSD, it is important to take into account some cautionary issues. For example, animal research does provide valid results; however, it is important to note that animal research does not necessarily always generalise to humans. Further, it is not apparent if autonomic increases and reactivity come before the development of PTSD or, in contrast, represent an outcome of exposure to a traumatic experience. Lastly, according to Freedy and Donkervoet (1995), while a predisposition to PTSD in combination with psychological factors mirrors an engaging trend in theoretical models of etiology, there is little evidence to support its validation.

From a psychological standpoint, Horowitz’s (1976) model has been influential (Calhoun & Resick, 1993) in the etiological theory of PTSD. This model is draws on psychodynamic principles, as well as cognitive theories of emotion and information theory (Calhoun & Resick, 1993). Horowitz (1976) suggested that adapting to a traumatic experience necessitates integrating the traumatic event into existing schema or developing new schema. The traumatic event will remain in active memory until this process is completed (Horowitz, 1986). While in active memory the event is out of conscious awareness and the mechanisms of emotional numbing and denial are used to prevent the individual from being overwhelmed by traumatic material and thoughts associated with the event (Calhoun & Resick, 1993). Nonetheless, images of the events kept in active memory have a propensity to be repeated in order to be processed and integrated into schema (Calhoun & Resick, 1993; Horowitz, 1986).

This leads to an alternation between episodes of intrusive ideas and emotions and phases of numbing and denial (Calhoun & Resick, 1993; Horowitz, 1986). Symptoms
of reexperiencing, such as flashbacks and nightmares are noted as intrusions intended to assist in information processing. Nevertheless, unrestrained intrusions may lead to retraumatisation and uncontrollable emotions (Calhoun & Resick, 1993; Horowitz, 1986). Numbing and avoidance are viewed as control mechanisms that attempt to regulate the information processing so that the person is not besieged (Calhoun & Resick, 1993). However, extreme control mechanisms may lead to the incomplete processing of the traumatic event. Thus, if information processing is not completed, partially processed traumatic information continues to be present in the active memory of the individual (Horowitz, 1986). Therefore, the person suffers chronic post-traumatic responses (Horowitz, 1986).

Keane, Zimering, and Caddell (1985) presented a behavioural formulation of PTSD, based on Vietnam veterans. The framework of their conceptual model is based on the two-factor learning theory of psychopathology postulated by Mowrer (1947; 1960). According to Keane et al. (1985), individuals can become conditioned to a multitude of stimuli that are present during the traumatic event (e.g., smells, sounds, time of day, etc.), and these stimuli can then induce anxiety reactions similar to those experienced at the time of the event (Keane et al., 1985). As noted by Jones and Barlow (1990), the principles of instrumental learning aid in the development of avoidance behaviour, because avoidance behaviours are learned as they end or decrease the existence of aversive conditioned stimuli.

Keane et al. (1985) reported that higher-order conditioning can partially explain the broad assortment of anxiety-provoking stimuli in PTSD. In this case, cues associated with the initial trauma event may become paired with other or related stimuli and become capable of eliciting the same symptomatology (Jones & Barlow, 1990; Keane et al., 1985). Further, and related to higher-order conditioning, stimulus generalisation helps to clarify the continuing exacerbation of PTSD over time (Keane et al., 1985). For example, a car backfiring may be similar enough to gunfire to evoke an aggressive response (Keane et al., 1985). Thus, Keane et al. (1985) reported that higher-order conditioning and stimulus generalisation can explain the extensive range of stimuli able to elicit memories of the trauma and/or its physiological elements. Keane et al. (1985) added, that the higher the number and array of stimuli that can
elicit the fear response, the harder it is for the traumatised combatant (trauma survivor) to effectively avoid these stimuli.

Foy et al. (1992) proposed an integrative model of PTSD. The central principle behind this model is that exposure to a traumatic event may lead to conditioned emotional reactions of psychological distress. Foy et al. (1992) put forward three routes by which conditioning of post-traumatic symptoms may occur. The first two noted routes are direct personal experience (e.g., being in a road accident) and observational experience (e.g., seeing the death or serious injury of someone). The third route is through vicarious experience (e.g., learning of harm or death to another). These pathways are essentially the same as those identified by Rachman (1977).

Foy et al. (1992) go on to add that other variables may mediate between trauma exposure (onset) and the conditioning or maintenance of acute or chronic PTSD. These variables are termed either “risk” or “resiliency” factors. If these factors increase the probability of PTSD occurring, they are termed “risk” factors. Alternately, if these factors decrease the probability of PTSD occurring, they are termed “resiliency” factors. These variables are psychological, social, and biological (Freedy & Donkervoet, 1995). Freedy and Donkervoet (1995) reported that the recognition of the potential significance of psychological, social, and biological factors in both the etiology and the maintenance of PTSD is beneficial.

Jones and Barlow (1992) proposed a biopsychosocial conceptualisation of PTSD. While questioning the classification of PTSD as an anxiety disorder (as opposed to belonging in another DSM category, e.g., dissociative disorder), Jones and Barlow stated, “Nevertheless, we have found consideration of the nature anxiety and panic and theories of etiology of the anxiety disorders to be useful in developing a more complete understanding of PTSD” (p. 149). They noted that the origins of anxiety involve a biological vulnerability to anxiety, as discussed earlier. Thus, they applied biological vulnerability to their model of PTSD. Further, they noted the role of psychological vulnerabilities (e.g., locus of control) in their PTSD model (Jones & Barlow, 1990). Jones and Barlow (1990) suggested that adverse life events before the trauma may contribute to the development of PTSD. While Jones and Barlow (1990, 1992) noted the necessity of the existence of a stressor, they also emphasised the
nature of the stressor as important. That is, "event that are perceived as uncontrollable or unpredictable are often more aversive and more likely to elicit a 'true alarm'" (Jones & Barlow, 1990, p. 317). True alarms are viewed as a fear response, which occurs when a person is confronted with a life-threatening experience (Jones & Barlow, 1990). Conversely, false alarms occur without the presence of a life-threatening event. Further, learned alarms are noted as conditioned reactions to either internal or external cues.

Therefore, Jones and Barlow (1990) reported that "if the vulnerabilities….line up correctly, an individual will experience the overwhelming true alarm and subsequent learned alarms as unpredictable, uncontrollable aversive events" (p. 319). They added that the person would respond to these with chronic overarousal and hypervigilance. This sets in motion a continuous cycle of anxious apprehension and reexperiencing. Jones and Barlow (1992) summarised, "the presence of excessive arousal as well as hypervigilance and attention narrowing on this arousal and any trauma-related intrusive thoughts would paradoxically increase, rather than decrease, reexperiencing of the trauma" (p. 156).

In regard to MVA-related PTSD, Kuch et al. (1996) believed that the cause of PTSD is best defined in multifactorial terms. Further, they note that the prevalence and specificity of learned fear supports the theory that MVAs can lead to PTSD. Classical (Pavlovian) conditioning in association with operant learning offers a model for the acquisition of fear (Kuch et al., 1996). Three findings (Kuch et al., 1996) have given support to this theory: heart rate response to audiotape reminders of MVA is strongly associated with PTSD-related psychopathology and nonremission; avoidant coping accounts for 41% of variability in intrusion scores on a PTSD scale; and amnesia caused by accident concussion appears to block the acquisition of MVA-related fears. In addition, Kuch et al. (1996) noted that premorbid vulnerability may contribute to psychopathology. Further, they suggested that the development of PTSD is associated with a history of other traumas and psychological disorders (estimated to be as high as 50%). These include anxiety and depression (pre-accident psychological variables will be discussed in more detail later).
Lastly, another approach to the causation of MVA-related PTSD is outlined by Taylor and Koch (1995). They advocated Mowrer's two-factor model (1960) and the later fear network model of Foa and Kozak (1986). These models proposed that PTSD stems from a fear structure stored in long-term memory, incorporating a system of information about stimuli and their meaning, and programs for reactions to those stimuli (e.g., escape, fear, and avoidance). The intensity of the trauma conditioning experience results in a broad range of stimuli (e.g., extraneous sights, sounds, and smells) becoming conditioned as fear stimuli. These stimuli are apt to act as reminders of the trauma or retrieval cues, thereby, activating the fear structure to generate distressing recollections of the MVA and chronic hyperarousal. Thus, noting the earlier model of Horowitz (1976), it could be suggested that the distressing recollections and chronic hyperarousal that arise in the pathways discussed above (Foa & Kozak, 1986; Mowrer, 1960) intensify the extreme control mechanisms noted by Horowitz (1976). Consequently, this would impede information processing due to numbing and avoidance.

1.11 POTENTIAL PREDICTORS OF MVA-RELATED PTSD

Blanchard, Hickling, Taylor, et al. (1996) reported that there have been four significant predictors found for the development of PTSD. These predictors are a previous psychiatric history, a fear of dying during the MVA, severity of injury, and the role of litigation. These issues will be discussed below in order to illustrate their influence in PTSD. Further, other variables that may influence the onset of posttraumatic sequelae will be outlined.

According to Chubb and Bisson (1996), there is some dispute regarding the relationship between past psychiatric history and the risk of acquiring PTSD. However, previous trauma experience (McFarlane, Atchison, & Yehuda, 1997), prior PTSD, and former depression have been found to predispose an individual to developing MVA-related PTSD (Blanchard, Hickling, Taylor, et al., 1996; Blanchard & Hickling, 1997). Furthermore, Barton, Blanchard, and Hickling (1996) found that people who have previously experienced dissociative reactions (e.g., depersonalisation and derealization) in response to trauma are more likely to develop PTSD symptomology than those who have not.
According to Ehlers et al. (1998), based on a large sample of MVA survivors, those who reported that they had emotional difficulties (e.g., depression, anxiety, and irritability) in the weeks prior to their accident were at a higher risk for developing chronic PTSD and greater PTSD severity than those who did not report prior emotional problems. Similarly, Koren et al. (1999) reported that they found amongst their MVA sample that previous psychiatric morbidity, particularly affective and anxiety disorders, were associated with PTSD at one year post-accident. In addition, Taylor and Koch (1995) believed that people with anxiety sensitivity (i.e., individuals who display an elevated level of anxiety in comparison to a normal population) may be at a higher risk of developing MVA-related PTSD.

Conversely, Chubb and Bisson (1996; 1999) found that a mental disorder may, in fact, work in the opposite way and act as a protective factor. They found in a study of mental health influences, following a coach accident, that schizophrenia was associated with a lower rate of developing PTSD than a non-schizophrenia comparison. Chubb and Bisson (1996; 1999) argued that antipsychotic medication taken by these individuals might impede the development of PTSD or, alternatively, that the severe disruption of information processing characteristic of schizophrenia may block the psychological impact of a traumatic incident. Overall, however, Chubb and Bisson (1996; 1999) supported the finding that pre-existing mental health difficulties are linked with a high occurrence of psychological sequelae following major trauma.

Perceived life threat (fear of dying) has been found to predict PTSD in both rape and combat victims (Best & Ribbe, 1995). Similarly, research by Blanchard, Hickling, Mitnick, et al. (1995) and Blanchard, Hickling, Buckley, et al. (1996) has found that perceived life threat is a predictor for PTSD in MVA survivors. Jeavons, Greenwood, and Horne (2000) found that accident cognitions, such as threat to life, fearing you might die or be injured, and distress at the accident and/or being in the hospital were indicative of post-accident distress at both three and six months. They noted that these initial cognitions, rather than accident variables (e.g., severity of injury, loss of consciousness, etc.) and demographics (e.g., age, prior trauma experience), had the strongest associations with ensuing traumatic reactions. Ehlers et al. (1998) reported that emotional response during an accident is associated with the development of
PTSD. They noted, in their research on a large MVA sample, that a survivor's ratings of how frightening the MVA was and reports of peritraumatic dissociation (i.e., dissociation during the trauma; see p. 44) correlated with a diagnosis of PTSD and symptom severity at both three months and one year post-accident.

It is important to realise that a fear of dying is relative to the individual; that is, it is the individual’s perception of danger that is crucial in determining a PTSD response (Best & Ribbe, 1995). Therefore, the intensity of the damage (both to the person and to property) in the accident does not necessarily strongly associate with the subsequent onset PTSD (Best & Ribbe, 1995). In fact, Blanchard, Hickling, Mitnick, et al. (1995) found that perceived threat to life was independent of the severity of physical injury. The suggested way to determine life threat is to ask the MVA survivor if they felt they were going to die during the MVA (Best & Ribbe, 1995). Moreover, as straightforward as this may appear, Best and Ribbe (1995) noted that this is a subjective judgement by the patient and should not be treated as an objective assessment to be made by the therapist, employers, family, or witnesses to the accident. Indeed, Malt and Olafsen (1992) found that psychological reaction to the MVA may depend more on subjective perception (threat to life) than objective evaluation (i.e., physician rated) of threat to life or physical integrity. Furthermore, accidents have been found to be psychologically traumatising even if the individual is physically unharmed (Kuch et al., 1991).

According to Best & Ribbe (1995), perceived life threat is important for three reasons. Firstly, for those MVA survivors that do seek treatment and, subsequently, do report life threat, clinicians should be more aware that the client’s expression of threat to life may indicate the likelihood that they will acquire PTSD. Secondly, the MVA survivor is not likely to recognise the link between life threat and intensity of PTSD symptoms, especially if the accident appears to be “minor in nature” (i.e., no deaths or physical injury). Consequently, the survivor may attribute their high level of distress to “weak character” rather than to their subjective evaluation of the danger. Thirdly, the victims’ family members, employers, or even third-party payers for potential therapy may not comprehend the concept of perceived life threat as it correlates with the development of PTSD. As a result, they may think the individual is overreacting to the trauma. If this is the case, they may hold unrealistic expectations of the MVA
survivor and may be unwilling to provide any emotional, financial, or social support. Lastly, an additional point that may tie into the concept of perceived threat to life is that individuals who develop PTSD have been found to have an attentional bias toward threatening stimuli (Bryant & Harvey, 1995b). Therefore, it could be suggested that this hypervigilance could predispose an individual to perceive excessive danger in a MVA. However, future research is required to clarify the influence attentional bias has in PTSD (Bryant & Harvey, 1995b).

Blanchard, Hickling, Mitnick, et al. (1995) and Blanchard, Hickling, Barton, et al. (1996) listed severity of injury as a potential predictor of PTSD development. Even though many accidents do not result in physical injury, a considerable number do, and for these individuals, the likelihood of PTSD emerging is increased (Best & Ribbe, 1995). Further, when physical injury is combined with other predictors (e.g., perceived life threat) the potential for the development of PTSD is elevated even more (Best & Ribbe, 1995). Best and Ribbe (1995) reported that more often than not physical injury and perceived life threat coincide; consequently, if this is the case, the individual may experience more symptoms of PTSD and symptoms may be more intense.

According to Best and Ribbe (1995), there are several reasons that may explain why physical injury may increase the probability of PTSD occurring in MVA survivors. Firstly, physical injuries may act as consistent visual and proprioceptive cues for reexperiencing symptoms. For example, the sight of a serious scar, the presence of a disfigured limb, localised pain, or the need for a wheelchair may serve as daily reminders of the accident. Secondly, the presence of pain may lower a person’s ability to cope with stress. A third reason is that physical injury may restrict the individual from returning to work or limit their productivity. Therefore, there is a possibility that reduction or loss of employment due to physical injury may lead to lowered self-esteem, emotional strain, and depression. Ensuing depression may limit the MVA survivor’s coping skills and heighten the chance of PTSD occurrence (note that the significant occurrence of comorbidity of depression and PTSD has already been discussed).
Despite the evidence pointing to a strong correlation between physical injury and the onset of PTSD, some research has found otherwise (Ehlers et al., 1998; Koren et al., 1999). Ehlers et al. (1998) noted from their large research sample that severity of injury was not significantly related to PTSD diagnosis or severity at either three months or one year post-accident. Further, a study by Bryant and Harvey (1995a) found that injury severity was not a predictor of PTSD in a sample of Australian MVA survivors. In addition, Blanchard, Hickling, Mitnick, et al. (1995) pointed out that even though they found statistically reliable associations between injury and PTSD, there are exceptions. They gave the following case as an example. A 23-year-old female who was involved in a single MVA in which she was ejected from the car after she lost control at high speed. She sustained fractures to both femurs, a severe laceration to one leg, and nerve damage to one knee. Furthermore, she received several fractured ribs as well as a collapsed lung. However, in spite of these injuries she did not develop PTSD.

Jeavons (2000) reported, based on her Australian sample, that MVA victims did suffer from psychological trauma symptoms despite a high percentage of them not sustaining serious injury or being admitted to hospital. Jeavons added that other variables, such as responsibility for the accident and the number of others in the accident, did not appear to contribute to variance on trauma measures. Importantly, Jeavons acknowledged that her study supported research by Blanchard, Hickling, Barton, et al. (1996) that noted severity of injury was a predictor for PTSD at 12 months post-accident. Subsequently, Jeavons (2000) stated, “Thus it may be that differing results in the literature with respect to the relationship between injury and psychological disorder may depend to some extent on the length of time post-accident measures are taken, with injury becoming more important in the longer term” (p. 506). Further, Jeavons, Greenwood, et al. (2000) noted that a participant’s self-rating of injury, instead of the doctor’s ratings or time spent in hospital, were more predictive of subsequent elevated trauma scores. Thus, perhaps it is the accident victim’s subjective interpretation of their physical injuries that is pivotal, rather than objective evaluations of their injuries. Therefore, it is important to realise that although severity of injury may be a strong predictor of the development of PTSD, it is not always the rule.
The last factor that Blanchard, Hickling, Taylor, et al. (1996) put forward as a possible predictor in the development of PTSD is litigation. That is, whether the individual has contacted a lawyer or not between the time of the accident and when he or she was assessed, is viewed by Blanchard, Hickling, Taylor, et al. (1996) to be a significant predictor. Ehlers et al. (1998) supported this finding. They reported that planned or instigated compensation claims at three months were linked to PTSD at both three months and one year post-accident. They reported that among those who had no related litigation, or were unsure about it, 16.4% experienced PTSD at three months and 8.1% at one year. In contrast, of those involved in or contemplating litigation 31.3% experienced PTSD at three months and 24.6% at one year. However, Scotti et al. (1995) noted that the clinician should be aware of patient malingering for compensation gains. Faking of PTSD is potentially achievable. For example, Lees-Haley (1990) found that untrained, nontraumatised volunteers could produce an Impact Event Scale result that was a believable reaction to distress caused by exposure to hazardous waste. Conversely, Burstein (1986) found no relationship between compensatory issues and those who developed PTSD after a MVA.

Blanchard, Hickling, Taylor, et al. (1996) reasoned that it could be that those who are seriously enough injured and distressed enough to fulfil the criteria for a diagnosis of PTSD that may be more inclined to seek the services of a lawyer. Still, it is possible that those who have determined that they will seek compensation are consequently more likely to represent themselves as more symptomatic, even to an independent assessor, and, therefore, are more prone to meeting PTSD diagnosis criteria. It is apparent that this predictor needs further research to evaluate its potential impact on the development of PTSD and malingering (Bryant & Harvey, 1995a). Regardless, the clinician needs to be cautious when assessing an individual for PTSD when compensation issues are involved (Scotti et al., 1995).

Of note, Bryant and Harvey (1995a) reported that an Australian study generated confounding results about the link between litigation and the development of PTSD. It could be suggested that the Australian sample is less influenced by compensatory gains as legal cases involving litigation for compensation are possibly less prevalent in Australia than in the United States. This conclusion may also apply to New Zealand
where personal injury litigation is severely restricted, although compensation is available on a no-fault basis through the Accident Compensation Corporation (ACC).

The role of ACC is, however, a complex one. ACC provides compensation, treatment, and rehabilitation for physical injuries and ACC recognises mental injury as a clinically significant behavioural, cognitive or psychological dysfunction. However, they will only provide compensation (in the form of counselling) for those whose mental injury is directly related to their physical injuries (i.e., mental injury due to MVA physical injuries). In contrast, ACC does not cover emotional consequences of an injury such as stress, hurt feelings, or loss of enjoyment, unless related to sexual abuse (ACC, 2003). Therefore the line between receiving compensation and not gaining it is a blurred one and the determination of those in need of aid is conducted under subjective terms. Given that a person’s mental injury is likely not to be recognised by ACC then the individual may be able to take private legal action against those who harmed them. Nevertheless, such court action would be difficult in terms of proving mental suffering requiring financial compensation. How the above will impact on levels of psychopathology related to MVA’s in New Zealand is unclear. It could be argued that ACC’s definition of mental injury and lack of recognition of those with psychological distress not related to physical injury (e.g., road accident survivors physically unharmed, witnesses) may lead to unnecessary mental anguish. That is, people suffering from post-trauma symptoms that do not meet ACC criteria will be potentially left untreated and may go on to develop an exacerbation of symptoms leading to an increase in psychopathology and consumption of health resources.

Given that ACC does not pay out compensation in the form of extensive lump sums, it would be difficult to see the gain in malingering or exaggerating mental health difficulties related to an MVA. However, there is the possibility some individuals may be treatment and help seeking regardless of a lack of psychopathology. Further, once accepted for ACC counselling the therapeutic attention they receive may act as a secondary gain. Additionally, it could be argued that for those who initially do have post-accident distress and receive ACC counselling, such counselling may reinforce the presence of psychopathology and impede the healing process. Consequently, ACC therapists as with any other therapists must be aware of this issue and identify clients
who may be exaggerating their distress and implement strategies to overcome such situations.

1.11.1 Other Potential Variables
According to Fullerton et al. (2000), peritraumatic dissociation during a road accident increases the risk for both acute and chronic PTSD. Marshall, Orlando, Jaycox, Foy, and Belzberg (2002) described peritraumatic dissociation as dissociation during the traumatic event. They noted the dissociation may present in various forms, including:

- Altered perception of the passing of time; a sense of detachment from self; or a sense that one’s surroundings are distorted or unreal (e.g., floating above the traumatic scene).

However, the role of peritraumatic dissociation (i.e., dissociation during the event) as a predictor of PTSD in road accident victims has received inconsistent support (Gershuny, Cloitre, & Otto, 2003; Holeva, Tarrier, & Wells, 2001; Shalev, Peri, Canetti, & Schreiber, 1996; & Ursano et al., 1999).

Ursano et al. (1999) noted that road accident survivors with peritraumatic dissociation were 4.12 times more likely to acquire acute PTSD and 4.86 times more likely to acquire chronic PTSD. Further, Shalev et al. (1996) reported peritraumatic dissociation following a range of traumatic events (53% of which were road accidents) was a strong predictor of PTSD symptom severity at six months post-event. Gershuny et al. (2003) reported that survivors of a range of traumatic events who noted elevated levels of peritraumatic dissociation also reported higher levels of PTSD symptoms. Nonetheless, Gershuny et al. (2003) stated “...fears of death and losing control during the event mediated the relation between peritraumatic dissociation and PTSD severity” (p. 7), and concluded that experiencing peritraumatic dissociation has an indirect rather than direct effect on PTSD. Further, Holeva et al. (2001) found that peritraumatic dissociation was not an independent predictor of PTSD in road accident victims. Nevertheless, Fullerton et al. (2000) noted that peritraumatic dissociation can be quickly and easily evaluated in road accident survivors; therefore, such assessment might be beneficial, as it provides the clinician with the opportunity to provide early psychological and pharmacological intervention for those identified at high-risk.
Chubb and Bisson (1999) reported that their research supported others’ findings that a predictor of poorer outcome is higher levels of psychological distress at initial evaluation. Koren et al. (1999) noted that despite most of their MVA participants exhibiting acute stress symptoms immediately following their accident, that symptom severity was more elevated in those who went on to develop PTSD. Further, Koren et al. reported that this early disparity appears to intensify during the first three months, i.e., they noted that PTSD participants tended to display noticeable and increasingly worsening symptoms in the first three months. In contrast, non-PTSD participants’ symptoms ameliorated to a level relative to those of normal comparisons. Further, Koren, Arnon, and Klein (2001) noted that severity of immediate post-accident, post-traumatic symptoms were indicative of chronic PTSD at one and three years post-accident.

Nightingale and Williams (2000) found that more negative attitudes to emotional expression, assessed within one week of the road accident, predicted subsequent intrusive symptoms and acute PTSD at six weeks. They added that this finding is consistent with findings with disaster survivors. Craig, Heisler, and Baum (1996) reported that research findings consistently demonstrated that emotional distress is associated with an increase in the number of intrusive cognitions, a deterioration of cognitive performance, and increased sensitivity to stress-related stimuli. Harvey and Bryant (1998a) found in a MVA sample, assessed for ASD and non-ASD, that attempted thought suppression of traumatic memories may add to the incidence of delayed post-traumatic thoughts, more so in those with an ASD diagnosis. They noted that these findings suggest an association between cognitive avoidance and increased intrusions in trauma survivors.

Recently, Fedoroff, Taylor, Asmundson, and Koch (2000) reported on a sample of MVA survivors. They noted that anxiety sensitivity, a cognitive factor, and pain severity were predictors of PTSD symptoms in their MVA survivors. They added that by reducing anxiety sensitivity and pain severity that PTSD symptoms reduced also. Fedoroff et al. (2000) noted anxiety sensitivity as the interpretation by an individual that arousal–related sensations are dangerous (e.g., signify harmful consequences such as death, insanity, or rejection by other). Thus, they reported that considering anxiety
sensitivity might be beneficial in the evaluation of individuals vulnerable to
developing chronic PTSD.

Overall, in regard to predictors of psychological distress following a road accident,
Blaszczynski et al. (1998) reported, from a review of the literature, that a number of
factors may contribute to psychological sequelae. These included, a history of trauma,
being of female gender, having a premorbid psychiatric illness, age, substance abuse,
and coping styles. Further, they noted additional variables included the accident type,
the victim's subjective interpretation of threat to life, type of injuries, and loss of life.
Post accident factors noted were disfigurement, extent of social support,
compensation, and permanency of injuries or disability. However, of importance, they
stated that while a combination of these factors may contribute to the risk of PTSD or
other psychological disorders, the significance of each of these factors in the resultant
sequelae has not yet been fully clarified.

1.12 OTHER ISSUES:

1.12.1 MVA-Related PTSD in Children

In the early nineties, Amick-McMullan, Kilpatrick, and Resnick (1991) reported that
there had been no research on the comparison of traumatic symptomatology between
adults and children. However, Scotti et al. (1995) pointed out that there is emerging
research that suggests that child accident victims experience behavioural and
emotional symptoms similar to those found with adult victims. Despite minimal
research in this area, the following symptoms have been noted from current research:
Nightmares in which the child relives the accident and other sleep disturbances;
enuresis; conduct problems; fear of the dark; separation anxiety; unwillingness to
cross the road or travel by car; and a fixation with road safety (Stallard & Law, 1993;
Taylor & Koch, 1995). Additional symptoms noted by Lowenstein (2001) included
difficulties with concentration, intrusive thoughts, difficulty communicating with
friends and family, mood disturbances, and a decline in academic performance.
Lowenstein (2001) reported that one-third of children involved in road accidents
expressed symptoms of PTSD. It has been suggested (Scotti et al., 1995) that PTSD in
children may persist into adulthood. Furthermore, the developmental stage that the
trauma occurs in is crucial as the child's development is related to their coping strategies and ability to contend with loss and death; moreover, trauma at a young age may lead to subsequent behavioural deficits and psychological vulnerability to future events (Scotti et al., 1995).

Di Gallo, Barton, and Parry-Jones (1997) found that children who experienced an accident as immediately distressing and threatening are prone to feelings of helplessness, vulnerability, and loss of control. Importantly, the trauma of a MVA event may be intensified by the use of medical equipment such as surgical collars, intravenous infusions, and monitoring equipment (Di Gallo et al., 1997). Further, Stallard and Law (1993) found that young peoples' experience of a casualty department produced considerable, unnecessary distress and anxiety. The fact that children, particularly young (cognitively immature) children, are unlikely to be able to rationalise a MVA and subsequent procedures may explain why the event remains inexplicable and intensely threatening (Di Gallo et al., 1997).

In addition, Di Gallo et al. (1997) noted that children may not benefit from the protective effects of amnesia. That is, in adults amnesia has been found to block trauma associated with an accident (Taylor & Koch, 1995). However, in children the trauma from the accident may be blocked by amnesia but the trauma associated with the hospital is not. Future research is required in this area to determine what are the possible influences of trauma and PTSD on childhood development and their future psychological wellbeing. The issue of psychological distress in children following a road accident is discussed in more detail in Part 3 of this thesis. This discussion is then followed by a report of a study that addresses this issue.

1.12.2 MVA-Related PTSD in Older Adults

PTSD in older adults has received minimal attention in PTSD research (Scotti et al., 1995). However, some information has been gained from the natural disaster literature. It has been found that older adults tend to report lower levels of emotional and physical distress than do younger disaster victims (Scotti et al., 1995). It has been suggested that older adults may perceive less disruption to their lives and wellbeing in response to trauma (Scotti et al., 1995). Further, Norris (1992) proposed that older
adults may actually have lower levels of PTSD, particularly after crime and accidents. However, there are some issues that need to be recognised in respect to the development of PTSD in older individuals. According to Scotti et al. (1995), these factors include poor physical health, decreased social support due to death of age-related friends and family, lower socio-economic status, less opportunity for recreational activities, and more frequent exposure to previous trauma, which may lead to higher psychological vulnerability to PTSD. There is a paucity of research into PTSD in older adults (Scotti et al., 1995). Future studies could usefully focus on the development and subsequent treatment of PTSD in this population, given the growth of this age group in most western populations.

1.12.3 Head Injury & Trauma

An accident severe enough to lead to open-head wounds or closed-head concussions may also be sufficiently traumatic to cause PTSD (Scotti et al., 1995). However, Scotti et al. (1995) remarked that clinicians and researchers need to be aware of the overlap in symptomatology between postconcussive head injury and PTSD. These include memory problems, attention difficulties, emotional lability, disinhibition, avoidance, and loss of interest. Further, to aid in determining if an individual has PTSD, Scotti et al. (1995) noted that the time course between head injury and PTSD differs. That is, mild postconcussive head injury is usually of brief duration (i.e., a few days to several months). Conversely, PTSD symptoms are considered chronic after three months. In regard to severe head injury, the differentiation from PTSD is more difficult. Severe head injury may lead to a loss of higher cortical functions and therefore more long-term or possibly permanent effects (Scotti et al., 1995).

Mayou, Black, and Bryant (2000) researched the interaction of unconsciousness, amnesia, and psychiatric symptoms following a MVA. They reported that PTSD, depression, and anxiety were more common at three months in those who were definitely unconscious at the time of their accident, than in those who were not. However, at one year there were no differences. They added that when they compared those with minor head injury (unconscious less than 15 minutes) with individuals with no head injury, that they found no differences in psychological consequences. In contrast, earlier research (Bryant, 1996) has suggested that loss of consciousness
during trauma may impede the cognitive processing of a traumatic event, thus, acting as a protective factor against PTSD. However, Mayou, Black, et al. (2000) noted that this is disconfirmed by their recent findings. They stated, “The conclusions [that PTSD is just as common in those who lost consciousness] are clearly at variance with our own previous conclusions from a series in which there were no cases of PTSD among the few subjects who were briefly unconscious” (p. 545).

Of interest to researchers, Mayou, Black, et al. (2000) found that participants were often uncertain about whether they had lost consciousness. Further, they significantly overestimated the rate of being unconscious in contrast to hospital records. Thus, Mayou, Black, et al. (2000) stated that it is evidently problematic for individuals to differentiate brief unconsciousness, acute concussion, and peritraumatic psychological dissociation.

1.12.4 Role of Anger, Guilt, & Responsibility in MVA-Related PTSD

Anger is an evident feature in MVA survivors (Hobbs & Mayou, 2000). The driver may blame another or feel angry for being wrongly placed at fault (Blanchard & Hickling, 1997). Kuch et al. (1996) noted that a MVA survivor’s psychological symptoms may be enhanced by anger or hostility. Ehlers et al. (1998) found that anger in MVA survivors at initial assessment was indicative of PTSD symptoms at three months and one year post-accident. Further, they reported that anger-related cognitions at three months and one year post-accident were associated with a diagnosis of PTSD and severity of symptoms. Importantly, according to Taylor and Koch (1995), intense anger or guilt about the accident may predict a poor efficacy for behavioural treatments of MVA-related PTSD. That is, treatment that includes exposure may, in fact, heighten anger or guilt by encouraging the MVA survivor to contemplate the circumstances of the trauma event (Taylor & Koch, 1995).

Attributions of responsibility and self-blame can effect the possible development of PTSD following a MVA (Delahanty et al., 1997; Ho, Davidson, Van Dyke, & Agar-Wilson, 2000). Interestingly, it has been suggested that blaming oneself for a MVA may actually protect the individual from acquiring PTSD. That is, assuming or knowing that one had some responsibility for the accident may provide a defence
against long-term distress because it suggests that one had some sense of control over the accident (Delahanty et al., 1997). In other words, according to Ho et al. (2000, p. 35), presuming that one is responsible for the MVA may act as a kind of "buffer" against long-term distress as it implies that one had some control over what occurred.

A study by Delahanty et al. (1997) found that MVA survivors who were not responsible for their accidents reported more long-term distress and were more likely to be diagnosed with PTSD than MVA survivors who felt responsible. It is suggested that those who develop PTSD and do not believe they were responsible, may not have seen anything that they could have changed; subsequently, they lose their confidence in their ability to drive and avoid future accidents (Delahanty et al., 1997). This perception of threat may be why these survivors, in comparison to those who feel responsible (therefore, could have controlled matters in the MVA better), are more likely to develop PTSD (Delahanty et al., 1997).

Hickling, Blanchard, Buckley, and Taylor (1999) replicated Delahanty’s findings by re-examining information gathered from their MVA survivors sample. Hickling, Blanchard, Buckley, et al. (1999) reported that those with PTSD who blamed themselves for their road accident expressed fewer symptoms at first and recovered more quickly in the first six months in contrast to those with PTSD who blamed others. Hickling, Blanchard, Buckley, et al. (1999) further revealed that those individuals who blamed others for their road accident were found to have higher Impact of Event Scale scores. Hickling, Blanchard, Buckley, et al. (1999) found that all of those (100%) with PTSD who assumed responsibility remitted within six months. On the other hand, out of those with PTSD who placed responsibility for the accident on others, only 42% remitted.

Ho et al. (2000), based on their research of MVA survivors, reported that coping style is important. Accepting accountability for the road accident can be either adaptive or maladaptive depending on the driver’s use of self-blame coping. They found that where the individual employed behavioural self-blame (rather than characterological self-blame), accepting responsibility for the accident decreased the emotion of anger. This in turn lowered the level of psychological distress related to avoidant behaviours and intrusive thoughts. Lower levels of psychological distress were linked with a
higher level of personal wellbeing. In contrast, when a driver persisted in implementing characterological self-blame coping, along with a responsibility attribution, the resulting emotion was guilt. In turn, these feelings of guilt augmented the level of psychological distress related to avoidant thoughts and intrusive thoughts. Thus, an increased level of psychological distress was coupled with a lower level of personal wellbeing. In addition, Ho et al. (2000) found, for both drivers and passengers, that blaming others for the road accident raised levels of anger. This anger then increased the amount of psychological distress and reduced the level of personal wellbeing. Therefore, while blame may be advantageous to a point, it may also be detrimental to the MVA survivor.

Of note, Blaszczynski et al. (1998), when noting the under represented sampling of young males in MVA studies, argued that it is probable that young male accident survivors, who are more likely to be sensation seekers and risk takers, may be less vulnerable to developing adverse psychological distress. However, they noted that because this group is frequently at fault in accidents, it is feasible that they are more prone to unfavourable psychological responses surfacing from the “burden of guilt” and responsibility (Blaszczynski et al., 1998, p. 118). This is an important point that needs to be acknowledged when interacting with this group and, possibly, with any other individuals who may have thrill seeking characteristics that contributed to the occurrence of a MVA.

In association with the role of responsibility for a MVA, is its influence on families. Ho et al. (2000) noted that there is a dilemma for injured family members and other relatives when faced with the conflict between the necessity to provide support for the loved one responsible for the accident and the need to express feelings of resentment and anger for what they have done. This scenario might lead to an environment of confused and contradictory emotions, including anger, irritability, frustration, and blaming (Ho et al., 2000). Ho et al. (2000) remarked that such an environment has the capacity to inhibit the normal recovery process of MVA survivors and their relatives. Additionally, Ho et al. (2000) noted that public sympathy is usually reserved for innocent victims only, leaving the person responsible for the accident lacking care and reluctant to seek it out. The combination of the factors above may exacerbate a family’s vulnerability to further psychological stress.
1.12.5 Alcohol as a Factor in MVA-Related PTSD

Delahanty et al. (1997) noted that they tried to recruit a sample that was representative of serious MVAs. However, a number of participants refused to take part in their research. Moreover, these individuals were noted as having higher blood alcohol levels at the time of their accidents. Surprisingly, of the articles reviewed, there was little reference to the role of alcohol intoxication or drug use at the time of the accident. Furthermore, there was insufficient indication given about how this would effect the development of PTSD. In fact, Blanchard and Hickling (1997), leading researchers in MVA-related PTSD, noted the paucity of drunk drivers in their research. They stated, “It is of interest that in our study, and in practice, we did not often evaluate the drunk driver, the driver ‘clearly in the wrong’…. “ (p. 295).

Mayou, Black, et al. (2000), when reporting on the role of unconsciousness in road accident victims, noted that alcohol was a factor in some of the accidents they studied. They related that a small subgroup of their participants, who were not unconscious at the time of their MVA yet had no recall of their accident, later experienced higher rates of PTSD than other participants. Mayou, Black, et al. (2000) noted that alcohol appeared to be a key factor in these accidents. They reflected that alcohol may lessen memory and, potentially, information processing. Mayou (1997) noted that most of those involved in a MVA, who had an existing drinking problem, continued to drink excessively in the short and long-term after their accident.

Twenty-eight percent of fatal accidents and 16% of injury accidents in New Zealand in 1996 had alcohol as a contributing factor (LTSA, 1997). Accordingly, noting the prevalence of alcohol related accidents, it appears inexplicable that such minimal research has been done in the area of alcohol and MVA-related PTSD. This is certainly an issue that requires further investigation.

1.13 FUTURE RESEARCH IN MVA-RELATED PTSD

In addition to investigation of the role of alcohol and drugs, there are a number of other issues in MVA-related PTSD that require further research. Firstly, psychophysiological assessment was discussed earlier in respect to the diagnosis of PTSD. Blanchard et al. (1991) suggested that more research on this would determine
if psychophysiological evaluation could confirm the diagnosis of PTSD, indicate malingering, and reveal treatment effects. Secondly, according to Bryant (1996), the role that pseudomemories play in PTSD needs further defining; that is, determining their causation and how these memories may effect the course of PTSD. Thirdly, another symptom that needs future clarification is psychic numbing (Blanchard & Hickling, 1997).

Meanwhile, comorbid diagnoses have been found to be frequent in MVA-related PTSD (Kuch et al., 1991). Despite this, there has been sparse research on this heterogeneous issue and further studies have been called for (Taylor & Koch, 1995). In addition, the influence that litigation has in PTSD also needs more explanation, particularly in regard to malingering (Bryant & Harvey, 1995a). Other areas of concern that need future study are the development and the impact of MVA-related PTSD on children and the elderly, and delayed-onset and undiagnosed MVA-related PTSD. Lastly, Miller, Goldberg, and Streiner (1995) suggested that defining the relevant characteristics of stressors, and determining why, when confronted with identical stressors, some individuals can cope with them, while others can not, is an area requiring further research.

1.14 CONCLUSION

The literature on MVA-related PTSD raises a number of issues that have been discussed in this review. Road accidents are unavoidable in cultures that are dependent on motorised transportation and, as this review has outlined, the possibility of PTSD occurring following a MVA is of concern. The first area of importance with MVA-related PTSD is that accurate estimates of epidemiology appear elusive due, in part, to the evasiveness of the disorder itself (i.e., avoidance leading to poor subject participation). Meanwhile, the clarification of accident phobia requires further attention. This is certainly an issue that needs to be redressed and more clearly defined. Moreover, accident phobia's potential to be comorbid with PTSD is an area that needs specification.

Delayed-onset PTSD following a MVA has been found to be reasonably common; however, more research is required to help predict those who will be afflicted with it.
Additionally, comorbidity and other diagnoses have been found to be frequent in MVA-related PTSD. Psychological disorders that may occur in the presence or absence of PTSD in MVA survivors include: chronic pain, depression, other anxiety conditions, and the previously mentioned accident phobia. A number of assessment strategies were discussed, with an emphasis being placed on using a broad range of evaluation measures (Best & Ribbe, 1995). Furthermore, psychophysiological assessment is emerging as a promising and potentially efficient assessment instrument.

Potential MVA-related PTSD predictors were presented. Previous psychological conditions appear to be a strong indicator of the development of PTSD following a MVA. Perceived life threat and severity of injury also appear to enhance the potential development of PTSD following a MVA, especially if these two predictors occur concurrently. However, litigation as a predictor is somewhat problematic with varying reports on its reliability. Further research is required to clarify its effectiveness as a predictor.

Lastly, the role of anger, guilt, responsibility, and alcohol were discussed. It appears that anger and guilt may enhance PTSD symptoms in some individuals. Responsibility acceptance/attribution may, however, actually act as a protective factor against the development of PTSD subsequent to a MVA. Meanwhile, the influence of alcohol in MVA-related PTSD is unclear and requires further study. Overall, PTSD and other psychopathology following a motor vehicle accident necessitate substantial concern, especially considering our dependence on motor vehicles and the prevalence of MVAs. Consequently, there appears to be no justification for dismissing the psychological consequences of road accidents and, therefore, future research into this area of mental health is essential.
PART TWO:

STUDY ONE
PART II

STUDY ONE: PSYCHOLOGICAL DISTRESS FOLLOWING A CYCLING ACCIDENT INVOLVING A MOTOR VEHICLE

2.1 INTRODUCTION

Involvement in road traffic accidents, including those of a nonserious nature, appear to increase the risk of severe psychiatric morbidity (Blaszczynski et al., 1998). Nightingale and Williams (2000) found in their research on road accident survivors that 20.5% of their participants acquired PTSD "unequivocally attributable to the road accident" (p. 250), even when the accident appeared to be minor from an objective point of view. Ehlers et al. (1998) established from a large representative MVA sample that PTSD is a frequent consequence and that it presents a considerable clinical problem. They found that more than half of their survivors met DSM-IV criteria of intrusive reexperiencing, hyperarousal, or distress brought about by these symptoms. Moreover, the high occurrence of post-traumatic symptoms that they noted is striking given that a high percentage of the sample did not suffer any injury or only sustained minor soft tissue damage. In fact, only 26% of their sample were admitted to hospital. In light of these findings, it needs to be recognised that road accidents regardless of injury need to be taken seriously.

The literature review, presented above, reported that up to 50% (Bryant & Harvey, 1995a) of road accident survivors may develop PTSD. In addition, a substantial number of those who do not meet a PTSD diagnosis may still suffer significant distress (i.e., they meet subclinical PTSD). Further, other forms of psychopathology may occur with or without PTSD in road accident survivors. Koren et al. (1999) found that 67% of their road accident sample who had PTSD also had a co-existing psychiatric diagnosis. Other possible psychological disorders that may occur following a road accident include depression, generalised anxiety disorder, specific (accident) phobias, agoraphobia, and psychoactive substance use disorder. While research into road accident survivors is expanding, there are a number of areas that need further research such as those accidents that involve children. Another group of road-users where reactions to accidents have been relatively neglected is cyclists.
While research in New Zealand (Collins, Langley, & Marshall, 1993) has addressed physical injuries sustained from cycling accidents, no New Zealand studies appear to attend to the psychological impact of cycling accidents. Collins et al. (1993) noted that there is at least one cycle per household in New Zealand. Further, they reported that out of all the types of cycling accidents studied, the most severe injuries and longest hospital stays resulted from a collision between a motor vehicle and a cycle. While a number of studies have included cyclists in their road accident samples (Blanchard & Hickling, 1997; Jeavons, 2000), to the researcher’s knowledge no research to date has exclusively focused on cyclists involved in road accidents with a motor vehicle. Mayou (1997) stated, “We know much less about the consequences of road accidents for pedestrians, cyclists and those in public service vehicles or for children” (p. 36). Mayou added that psychiatric outcomes for these groups may be comparable to motor vehicle accident survivors.

Taylor and Deane (2000) remarked that a focal point for most research in this area has been on MVA survivors and PTSD as a diagnostic consequence. They noted that this focus may have lessened the scope of assessment for this likely varied group. They suggested that researchers need to “temporarily step back to focus instead on describing the characteristics of these people [accident victims] in more detail” (Taylor & Deane, 2000, p. 283). They suggested focusing on the types of situations feared and the amount of anxiety or avoidance associated with these conditions. While they concentrated their comments on “driving-fearful individuals”, the researcher has taken heed of their remarks and applied them to this research, i.e., this study aims to take a broad approach to psychological distress. While PTSD is central to this type of research, in this study a diagnostic agenda will not take precedence. However, PTSD and other psychopathology, as noted in the preceding review, are of importance in that their nosology provides a contextual framework to work within and from. Thus, this research will aim to look at psychological distress in cyclists following an accident involving a motor vehicle, with the key issues of PTSD, and the like, as a foundation to work from rather than an exclusive assessment objective.
2.2 METHOD

2.2.1 Participants

2.2.1.1 Participant Characteristics

The participants were 27 adults aged from 18 to 68 years, of varying ethnicity, predominantly New Zealand-European (Pakeha). The minimal age for inclusion was 18 years with no upper age limit restriction. Individuals under 18 years were excluded to ensure that participants were all legal adults. Further exclusion criteria included that the participant, if knocked unconscious during the accident, was unconscious for no longer than 15 minutes. The maximum of 15 minutes was based on research criteria used by Mayou et al. (1993) in their research on road accident survivors.

A further exclusion criterion was related to the time of the accident’s occurrence and the time of the interview. Firstly, the interview had to be at least one month after the accident. This was in accordance with DSM-IV criteria (APA, 1994) for PTSD, which requires that the individual is symptomatic for at least one month, as endorsed by Blanchard and Hickling (1997). The maximum elapsed time since the accident was set at 12 months. Initially, the researcher chose an outer limit of six months. However, participant response was low, which in part may be due to a limited population base [341,000 (in 1999) in Christchurch, New Zealand; Statistics New Zealand, 2001]. Consequently, the outer limit was extended to 12 months in order to recruit a larger sample.

Personal communication from Edward Blanchard, Ph.D. (May, 1999), a principal researcher in motor-accident-related psychological trauma, pointed out that a four-month outer limit was desirable in order to avoid possible distortion in the participant’s description of their pre-accident status. However, he noted he was currently (1999) recruiting a research sample in the six months to two years post-accident bracket and believed recall of their immediate (one to two months) post-accident status would be “fairly accurate”. Therefore, the researcher believed a 12-month period since the accident would be permissible in light of the population base.
available. Lastly, research criteria necessitated that the cyclist had been involved in an accident that included a motor vehicle.

2.2.1.2 Participant Selection
Participant selection was non-random self-selection over a nine-month period (September, 1999 - May, 2000). The participants in this study responded to two separate articles printed in a local Christchurch newspaper (see Appendices A & B). In addition, a brief advertisement was placed under the Public Notices section of the local newspaper (see Appendix C) on a number of occasions. Further, a small recruitment poster and explanatory letter was mailed out to 100 general practitioners’ and physiotherapists’ offices in the Christchurch area (see Appendix D). Lastly, a brief interview with the researcher was broadcast on a local regional television station.

2.2.2 Questionnaires/Measures

2.2.2.1 Categories of Cycling Accidents (Atkinson & Hurst, 1983; Appendix E)
Atkinson and Hurst (1983) presented a classification system for cycling accidents based on the type of collision that occurred between a cyclist and motor vehicle. This classification system was adopted from Cross and Fisher (1977; cited in Atkinson & Hurst, 1983). This system was utilised in this study as a way of accurately identifying the type of accident the participants had experienced. The researcher determined the accident type through the participant’s verbal description, written description, and/or showing the participant diagrams from the classification system and confirming the type they had experienced. Appendix F contains a description of the types of accidents as adapted from Atkinson and Hurst’s (1983) classification system.

2.2.2.2 Depression – Anxiety – Stress Scales (DASS: Lovibond & Lovibond, 1996)
The DASS is an adult self-report inventory containing 42 items. The scale assesses the emotional states of depression, anxiety, and stress over the past week, with 14 items per sub-scale. Lovibond and Lovibond (1996) reported the following as “characteristics of high scorers on each DASS scale” (p. 2). On the Depression scale they noted: Self-disparaging; dispirited, gloomy, blue; convinced that life has no meaning or value; pessimistic about the future, unable to experience enjoyment or
satisfaction; unable to become interested or involved; and slow, lacking in initiative. On the Anxiety scale they documented: Apprehensive, panicky; trembly, shaky; aware of dryness of the mouth, breathing difficulties, pounding of the heart, sweatiness of the palms; and worried about performance and possible loss of control. On the Stress scale they noted: Over-aroused, tense; unable to relax; touchy, easily upset; irritable; easily startled; nervy, jumpy, fidgety; and intolerant of interruption or delay.

Raw scores from each scale can be converted to Z scores to allow for comparisons between scales and for severity labels to be applied. Table 3, below, outlines the severity ratings and their corresponding percentiles and Z scores. Norms were based on a sample of 2914 individuals, 1044 males and 1870 females, with an age range 17-69 years (Lovibond & Lovibond, 1996).

<table>
<thead>
<tr>
<th>Table 3. DASS Severity Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z Score</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Mild</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Severe</td>
</tr>
<tr>
<td>Extremely Severe</td>
</tr>
</tbody>
</table>

(Table Adapted from Lovibond & Lovibond, 1996)

Researchers Brown, Chorpita, Korotitsch, and Barlow (1997) reported that their studies provided "strong support for the psychometric properties of the DASS". According to Antony, Bieling, Cox, Enns, and Swinson (1998), the DASS is a reliable and valid measure for the assessment of depression, anxiety, and tension-stress. They reported that the DASS depression scale appears to measure characteristics that are exclusive to depression and that the DASS anxiety scale measures characteristics unique to anxiety. In regard to the stress scale, they noted that it measures features of both anxiety and depression. Further, Antony et al. (1998) reported that the DASS is applicable to both clinical and nonclinical populations.
The Impact of Event Scale (IES: Horowitz, Wilner, & Alvarez, 1979)
The present study was directly modelled on Bryant and Harvey’s (1996) study on MVA victims and in particular the selection of the IES followed their research design. The IES is a 15-item self-report scale that assesses an individual’s current subjective distress associated with a particular traumatic event (Horowitz et al., 1979). It measures the occurrence of symptoms of subjective distress for the seven days leading up to the time of administration (Best & Ribbe, 1995). Because of IES’ use in Bryant and Harvey (1996) and because it broadly assesses psychological distress, rather than PTSD specifically, it was selected as an appropriate measure in the present study. From its two sub-scales the IES generates three scores (1) the intrusion sub-scale (e.g., intrusive thoughts, dreams, and images), (2) the avoidance sub-scale (e.g., conscious avoidance of feelings and situations), and (3) total IES score. Scores are computed by allocating the weight 0, 1, 3, and 5 to the frequency types marked (Horowitz et al., 1979; Zilberg et al., 1982).

The present study adopted the scoring interpretation system used by Bryant and Harvey (1996) in their research on post-traumatic responses in Australian MVA victims. Bryant and Harvey (1996) sourced their categorisation system from McFarlane’s (1988) research on Australian fire fighters. The reason for using the score interpretation system used by Bryant and Harvey is that their sample was similar to the present study in that it involved road accident victims and, secondly, their Australian sample is culturally more comparable to this study’s New Zealand participants than other overseas samples.

The classification of IES scores used is as follows: low (< 20), moderate (20 – 29), and high (≥ 30). Further, scores on the intrusion and avoidance scales can also be classified. For intrusion (IES-Int.), classification is as follows: low (< 10), moderate (10 – 19), and high (≥ 20). For avoidance (IES-Av.), classification is as follows: low (< 10), moderate (10 – 19), and high (≥ 20).

According to Horowitz et al. (1979) the IES sub-scales have the required psychometric properties in regard to internal reliability. This applies to both patient and nonpatient groups. Further, Zilberg, Weiss, & Horowitz (1982) reported that the
reliability of IES is substantiated by adequate test-retest results. Horowitz et al. (1979) noted that the IES sub-scales are sensitive as they are able to differentiate between various populations of individuals and identify change over time. Zilberg et al. (1982) reported that the sub-scales, established from clinical observation, were noted to have empirical validation.

Blanchard and Hickling (1997) reported that they believed the IES is a "useful psychometric measure" (p. 78), however, they pointed out that it should not substitute for a structured clinical interview. According to Best and Ribbe (1995), the sub-scales' correlation with PTSD symptoms and the conciseness of the IES make it a valuable tool in the initial assessment and monitoring of accident victims. Shipherd et al. (2000) reported that the IES is beneficial for the evaluation of MVA-related PTSD in a clinical setting. Lastly, Briere and Elliot (1998), reporting from a psychometric analysis of the IES, suggested that it may have satisfactory reliability and validity to permit its use as a brief clinical screen for post-traumatic avoidance and intrusion. Additionally, they stated that there does not seem to be true gender or race disparities, indicating its appropriateness for a variety of individuals.

2.2.2.4 Cycling Accident Fear Questionnaire (CAFQ; Appendix G)

The CAFQ is a self-report measure, adapted with permission, from the Accident Fear Questionnaire (AFQ; Kuch, Cox, & Direnfield, 1995). In regard to the AFQ, it was designed to screen for PTSD and phobic avoidance after an individual has been involved in a motor vehicle accident (Asmundson, Cox, Larsen, Frombach, & Norton, 1999). The AFQ contains a 10-item accident profile and a 10-item phobic avoidance (AFQ-PA) sub-scale (Asmundson et al., 1999).

According to Asmundson et al. (1999), the AFQ has potential as a diagnostic screening tool. Nonetheless, they noted that users should be aware of its limitations. Asmundson et al. (1999) questioned the value of the 10-item accident profile due to poor internal consistency. However, they reported that the AFQ-PA possessed good internal consistency and discriminant validity. Thus, Asmundson et al. (1999) reported that, "it appears that the AFQ-PA may be most useful as a method of screening out individuals in need of more detailed assessment of MVA-related fear
and avoidance” (p. 384), i.e., detecting those who do not express clinically significant phobic avoidance (Asmundson et al., 1999).

The researcher believed that the AFQ was a good basis for gaining qualitative information about an individual’s accident, through the accident profile. Further, it is believed that the AFQ-PA sub-scale is a good indicator of avoidance behaviour. A number of changes were made to the AFQ in its development to the CAFQ. These changes were in order to make it more applicable to cyclists. The accident profile was increased to 11 items instead of 10. The AFQ-PA increased from 10 items to 12 in the CAFQ. Further, the response scale was changed from an eight point Likert type scale to a five-point scale. That is, participants could rate their avoidance with the following responses: 1 = Never avoid it; 2 = Rarely avoid it; 3 = Sometimes avoid it; 4 = Often avoid it; and 5 = Always avoid it. The researcher wanted to query the participants’ reactions to both cycling and other travel (e.g., car), therefore, some additional items were required, as well as, some rewording for appropriateness for cyclists and New Zealanders (e.g., “Streetcar” to “Bus”). The researcher does not claim that the CAFQ has the same psychometric properties as the AFQ. Nonetheless, it is argued that the changes made to the AFQ should not detract from its utility.

2.2.2.5 Questionnaire on Perceived Impact of Cycling Accident (QPIC; Appendix H)

This questionnaire was designed by the researcher and his supervisor in order to gain information about the participant from a significant other (i.e., partner, parent, sibling, or friend). That is, the questions aimed to assess how the significant other viewed the cycling accident’s impact on the participant. There are 19 items in this questionnaire that are rated on a Likert-type scale. The scale ranges from 1 to 5, with each value representing a frequency descriptor (e.g., 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always). Significant others could also place ‘DK’ beside the item if they did not know or leave it blank if it was not applicable. The questions enquire about the participant’s perceived emotional state during cycling, car travel, and so forth. Further questions ask about avoidance of cycling and road using behaviour. The QPIC also asks about mood and sleeping behaviour (if known) as viewed by the significant other. Lastly, an opened-ended question ends the QPIC, allowing the significant other to note any other changes in the participant since the accident.
2.2.3 Interview

2.2.3.1 Cycling Accident Interview (CAI; Appendix D)

The CAI is a structured interview adapted, with permission, for this research from Blanchard and Hickling's (1997) Motor Vehicle Accident Interview (MVA Interview). According to Blanchard and Hickling (1997), the MVA Interview was developed to evaluate the "details of the MVA, immediate physical and medical consequences and treatments, subjective reactions to the accident, and the effects of the MVA on subsequent travel behavior" (p. 41).

The CAI was kept comparable to the MVA Interview in order to retain its assessment characteristics as noted above. The adaptation process required some rewording and additional questions in order for the CAI to be more applicable to cyclists. An additional rating scale was incorporated into the CAI with the purpose of recording the level of physical injury sustained and time required in hospital for the cyclist and, if relevant, any others involved in the accident. The scale denoted the following: "Very minor" = no medical attention; "Minor" = requires first aid; "Moderate" = visit to a medical centre; and "Severe" = hospital admission or attention (i.e., for broken bones or day surgery).

Two other changes in the adaptation process were that the Clinical Administered PTSD Scale (Blake et al., 1990) and the Whiplash Questionnaire (Blanchard & Hickling, 1997) were not employed, for the reason that they were not seen as a requirement for this study and, because their exclusion reduced the time required for the interview.
2.3 PROCEDURE

2.3.1 Initial Response
Participants responded to the newspaper articles or advertisements, GP flyers, or television interview by contacting the researcher at the University of Canterbury by telephone or through email. Once contact was made, the researcher gave a brief summary of the study over the telephone. The researcher also screened participants for acceptance for the study at this stage. If the participant was suitable to take part, and willing to do so, then a time was arranged to meet.

2.3.2 Interview
The researcher interviewed the participant at the University of Canterbury or at the participant’s home if that was more convenient for them. On arrival, the participant was given an Information Sheet to read over (Appendix J). Following this, if they chose to participate they were given a Participant Consent Form (Appendix K) to read and sign. This form also obtained the participant’s consent for a significant other to be contacted.

The participant then went on to complete the self-report measures (i.e., DASS, IES, & CAFQ). The researcher, a post-graduate, second year Clinical Psychology student, administered the CAI. During the initial stages of the CAI, when the participant described their cycling accident, the Categories of Cycling Accidents form was completed. The time taken for the interview and self-report forms to be completed ranged from one to two hours, depending on the complexity of the accident and its outcome. Once the interview had ended, the participant was given the QPIC and a Significant Other’s Consent Form (Appendix L) in an envelope to pass on to their significant other or the forms were given to the significant other if they were at the participant’s place of residence. The significant others’ forms were returned by post.

2.3.3 Debrief
Upon completion of the interview, the researcher queried how the participant was feeling after discussing their accident. The researcher made a point of informing the participant about seeing their GP or a mental health worker, currently or in the future, if they had any concerns about their psychological condition.
2.4 RESULTS

2.4.1 Descriptive Information

2.4.1.1 Age & Gender
The mean age of the participants was 38 years and 10 months (range 18 - 68 years). Eleven females took part in this study and 16 males.

2.4.1.2 Ethnicity
The sample was comprised of individuals of the following ethnic origins. Twenty-four participants (89%) identified themselves as New Zealand-European, two participants (7%) identified themselves as European, and one participant (4%) reported being of Australian-European ethnicity.

2.4.1.3 Accident Type
All participants were cyclists and their specific type of accident is discussed below under the results found in the Categories of Cycling Accidents forms.

2.4.1.4 Time from the Accident to the Interview
The range of time from the accident to the interview ranged from two months through to 12 months. The mean time between the accident and interview was 5.8 months.

2.4.1.5 Previous Psychological Difficulties
Participants, when interviewed, were queried if they had had any psychological difficulties in the past. Eight participants (three females and five males) reported a history of a psychological disorder. That is, 30% of the sample noted previous psychological difficulties. Of these eight, five reported a mood disorder, two noted an anxiety disorder, and one reported a pain disorder.

2.4.2 Questionnaires/Measures

2.4.2.1 Categories of Cycling Accidents (Based on Atkinson & Hurst, 1983)
Table 4, to follow, details the types of accidents participants were involved in
according to the classification system outlined by Atkinson and Hurst (1983). Of note, six (22%) accidents involved a motorist opening their door in a cyclist’s pathway. Six (22%) accidents involved a collision at a roundabout intersection. Two (7%) of the cyclists reported that their accidents involved road rage on the part of the motorist. Overall, Type C accidents accounted for nine (33%) of the accidents; Type D accounted for four (15%) of the accidents; Type E accounted for one (4%) of the accidents; Type F accounted for six (22%) of the accidents; and Type G accounted for seven (26%) of the accidents (see Appendices E & F for accident type definitions).
<table>
<thead>
<tr>
<th>ID #</th>
<th>CLASS</th>
<th>TYPE</th>
<th>DESCRIPTION of ACCIDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E</td>
<td>19</td>
<td>Cyclist made a right turn and was hit by an oncoming car.</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>24</td>
<td>Cyclist hit by car, travelling in same direction, that turned left in front of cyclist, cutting off cyclist's path of travel.</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>9</td>
<td>Car failed to give way to cyclist who was already on a roundabout with right of way.</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>12</td>
<td>Car failed to give way to cyclist at a roundabout and made no attempt to slow down at give way sign.</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>24</td>
<td>Cyclist and bus both parallel on a roundabout, bus turned left blocking cyclist straight pathway and resulted in collision.</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>23</td>
<td>Right turning car, from opposite direction, hit straight moving cyclist.</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td>11</td>
<td>Cyclist collided with car reversing from a driveway.</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>9</td>
<td>Car drove through signed intersection and failed to give way to cyclist.</td>
</tr>
<tr>
<td>11</td>
<td>G</td>
<td>26</td>
<td>Cyclist was turning a corner when a car, which was also turning, hooked the side of her cycle as it went by. The cyclist was towed around the corner before being freed.</td>
</tr>
<tr>
<td>12</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
<td>9</td>
<td>Cyclist was cycling through an intersection when a car failed to give way to him and, consequently, the cyclist hit the side of the car as it passed through the intersection.</td>
</tr>
<tr>
<td>14</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>15</td>
<td>C</td>
<td>9</td>
<td>Motorist failed to give way to turning cyclist at signed intersection.</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>23</td>
<td>Motorist turned right, from a parallel path from opposite direction, collision with cyclist occurred as the car cut off the cyclist's pathway.</td>
</tr>
<tr>
<td>17</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>22</td>
<td>Motorist and cyclist on parallel path going in same direction, cyclist on the outside of the car (double parked). The car swung into a u-turn cutting cyclist off.</td>
</tr>
<tr>
<td>19</td>
<td>G</td>
<td>25</td>
<td>Occupant of a stationary car opened door in cyclist's pathway, cyclist collided with door.</td>
</tr>
<tr>
<td>20</td>
<td>C</td>
<td>9</td>
<td>Car failed to give way to cyclist who was already on a roundabout with right of way.</td>
</tr>
<tr>
<td>21</td>
<td>D</td>
<td>16</td>
<td>Motorist overtook cyclist on a roundabout, misjudged space needed and clipped cyclist with car's side mirror.</td>
</tr>
<tr>
<td>22</td>
<td>C</td>
<td>12</td>
<td>Car failed to give way to cyclist at a roundabout and made no attempt to slow down at give way sign.</td>
</tr>
<tr>
<td>23</td>
<td>C</td>
<td>12</td>
<td>Car failed to give way to cyclist at signed intersection and made no attempt to slow down.</td>
</tr>
<tr>
<td>24</td>
<td>D</td>
<td>13</td>
<td>Cyclist was hit from behind by vehicle, cyclist believed collision was intentional rather than inadvertent.</td>
</tr>
<tr>
<td>25</td>
<td>D</td>
<td>13</td>
<td>Cyclist was hit from behind, motorist reported not seeing the cyclist.</td>
</tr>
<tr>
<td>26</td>
<td>F</td>
<td>23</td>
<td>Motorist turned right, from a parallel path from opposite direction, collision with cyclist occurred as the car cut off the cyclist's pathway.</td>
</tr>
<tr>
<td>27</td>
<td>D</td>
<td>16</td>
<td>Motorist overtook cyclist on a downhill road, misjudged space needed and car's back end clipped the cyclist sending the cyclist into the air.</td>
</tr>
</tbody>
</table>
2.4.2.2 Depression – Anxiety – Stress Scales (DASS: Lovibond & Lovibond, 1996)

Table 5, below, compares the means and standard deviations from the scales in this study with the normative sample of Lovibond and Lovibond (1996). A t-test was conducted to compare the Depression, Anxiety, and Stress means (5.44, 4.63, & 10.04 respectively) from the current study with the means (6.34, 4.70, & 4.91 respectively) from Lovibond and Lovibond’s (1996) sample. This revealed no significant differences (p > 0.05).

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Anxiety</th>
<th>Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Lovibond &amp; Lovibond (1996)</td>
<td>6.34</td>
<td>6.97</td>
<td>4.70</td>
</tr>
<tr>
<td></td>
<td>10.11</td>
<td>7.91</td>
<td></td>
</tr>
<tr>
<td>Current Study</td>
<td>5.44</td>
<td>6.92</td>
<td>4.63</td>
</tr>
<tr>
<td></td>
<td>10.04</td>
<td>7.97</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 presents participants’ raw scores on the DASS and details severity levels. Three participants (11%) noted depression levels above normal; two reported Moderate and one reported Extremely Severe levels. On the Anxiety scale, five participants (19%) expressed above normal levels; one noted Mild, one noted Moderate, two noted Severe, and one reported Extremely Severe levels. On the Stress scale, six participants (22%) reported above normal levels; three noted Mild, two noted Moderate, and one reported Extremely Severe levels. Of note, three participants (11%) reported Moderate levels or above on at least two of the scales.
<table>
<thead>
<tr>
<th>ID #</th>
<th>DEPRESSION</th>
<th>ANXIETY</th>
<th>STRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>8+</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>17*</td>
<td>20++</td>
</tr>
<tr>
<td>9</td>
<td>32**</td>
<td>29**</td>
<td>36**</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>2</td>
<td>16+</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>2</td>
<td>17+</td>
</tr>
<tr>
<td>14</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>6</td>
<td>16+</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>11+++</td>
<td>11</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>6</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>8</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>22</td>
<td>16+++</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>17+++</td>
<td>15*</td>
<td>24+++</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

*Note:*  
+ Mild  
++ Moderate  
* Severe  
** Extremely Severe
2.4.2.3 Impact of Event Scale (IES: Horowitz et al., 1979)

Table 7, below, details how participants responded to the items on the IES. Table 8, over, indicates participants’ scores in regard to the low, moderate, or high classification system for total IES scores and sub-scale scores. With regard to total IES scores, it was found that 22% (n = 6) of the sample were in the high range, 15% (n = 4) in the moderate range and 63% (n = 17) in the low range.

Table 7. Participant Response Distribution on the Impact of Event Scale

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>NOT AT ALL</th>
<th>RARELY</th>
<th>SOMETIMES</th>
<th>OFTEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I thought about it when I didn’t mean to.</td>
<td>12</td>
<td>5</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>2. I avoided letting myself get upset when I thought about it or was reminded of it.</td>
<td>14</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3. I tried to remove it from memory.</td>
<td>19</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4. I had trouble falling asleep or staying asleep, because pictures or thoughts about it that came into my mind.</td>
<td>22</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5. I had waves of strong feelings about it.</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6. I had dreams about it.</td>
<td>22</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>7. I stayed away from reminders of it.</td>
<td>18</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8. I felt as if it hadn’t happened or it wasn’t real.</td>
<td>18</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9. I tried not to talk about it.</td>
<td>19</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>10. Pictures about it popped into my mind.</td>
<td>3</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>11. Other things kept making me think about it.</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>12. I was aware that I still a lot of feelings about it, but I didn’t deal with them.</td>
<td>14</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>13. I tried not to think about it.</td>
<td>16</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>14. Any reminder brought it back feelings about it.</td>
<td>9</td>
<td>5</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>15. My feelings about it were kind of numb.</td>
<td>16</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>ID #</td>
<td>INTRUSION</td>
<td>AVOIDANCE</td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10*</td>
<td>4</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>3</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>20**</td>
<td>12*</td>
<td>32**</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>15*</td>
<td>34**</td>
<td>49**</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>25**</td>
<td>15*</td>
<td>40**</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>8</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>10*</td>
<td>11*</td>
<td>21*</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>12*</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>25**</td>
<td>40**</td>
<td>65**</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>20**</td>
<td>7</td>
<td>27*</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>19*</td>
<td>10*</td>
<td>29*</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>5</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>11*</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>24**</td>
<td>9</td>
<td>33**</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>17*</td>
<td>26**</td>
<td>43**</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>17*</td>
<td>9</td>
<td>26*</td>
<td></td>
</tr>
</tbody>
</table>

Note: * Moderate, ** High,
Table 9, below, compares the percentage of participants found in each category with that of Bryant and Harvey (1996). Bryant and Harvey (1996) assessed post-traumatic stress in 114 MVA victims within 15 days of hospital admission, using the IES as one of their measures. Note, IES scores were classified as follows: low (< 20), moderate (20 – 29), and high (≥ 30). Further, scores on the intrusion and avoidance scales can also be classified. For intrusion (IES-Int.), classification is as follows: low (< 10), moderate (10 – 19), and high (≥ 20). For avoidance (IES-Av.), classification is as follows: low (< 10), moderate (10 – 19), and high (≥ 20).

<table>
<thead>
<tr>
<th></th>
<th>LOW</th>
<th>MODERATE</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>IES Total (B &amp; H)</td>
<td>49</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>IES Total (present study)</td>
<td>63</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>IES-Int. (B &amp; H)</td>
<td>56</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>IES-Int. (present study)</td>
<td>59</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>IES-Av. (B &amp; H)</td>
<td>50</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>IES-Av. (present study)</td>
<td>59</td>
<td>22</td>
<td>11</td>
</tr>
</tbody>
</table>

Note: (B & H) = Bryant and Harvey (1996)

A chi-squared test for goodness of fit was conducted to compare the current study’s total IES scores with Bryant and Harvey’s (1996). This revealed a significant difference [$\chi^2(2)=7.81, p<0.05$] indicated by a larger proportion of participants in the present study reporting low post-traumatic symptoms (63%) than in Bryant and Harvey (49%). Further, a lower proportion of participants in the present study reported high post-traumatic symptoms (22%) than in Bryant and Harvey (31%).

Separate chi-squared tests for goodness of fit were performed for the current study’s IES Intrusion and Avoidance scores compared with Bryant and Harvey’s (1996) findings. This revealed no significant difference [$\chi^2(2)=2.42$, $ns$], between the Intrusion scores from the two studies and a significant difference [$\chi^2(2)=7.34, p<0.05$].
in Avoidance scores, with a larger proportion of participants in the present study reporting low avoidance symptoms (59%) than in Bryant and Harvey (50%). Further, a lower proportion of participants in the present study reported high avoidance symptoms (11%) than in Bryant and Harvey (18%).

Table 10, over, summarises findings on the IES in other studies on MVA survivors. Means and standard deviations are given in most cases. Further, as well as the mean for the total IES score, both IES Intrusion and IES Avoidance sub-scale means are specified. Lastly, the present study’s findings are presented at the bottom of the table. That is, an IES Total mean of 18.9 (SD: 16.3), IES Intrusion mean of 10.1 (SD: 8), and an Avoidance IES mean of 8.8 (SD: 10.1).
<table>
<thead>
<tr>
<th>STUDY</th>
<th>COUNTRY</th>
<th>N</th>
<th>TIME SINCE ACCIDENT</th>
<th>IES - TOTAL MEAN (S.D.)</th>
<th>IES - INTRUSION MEAN (S.D.)</th>
<th>IES - AVOIDANCE MEAN (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanchard, Hickling, Vollmer, et al. (1995c)</td>
<td>United States</td>
<td>40</td>
<td>1 - 4 months</td>
<td>36.3 (21.0)</td>
<td>17.4 (10.0)</td>
<td>18.9 (11.2)</td>
</tr>
<tr>
<td><strong>PTSD diagnosed group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-syndromal PTSD diagnosed group</td>
<td>United States</td>
<td>25</td>
<td>1 - 4 months</td>
<td>18.7 (15.2)</td>
<td>8.7 (7.2)</td>
<td>10.0 (8.3)</td>
</tr>
<tr>
<td>Kuch, Cox, &amp; Direnfeld (1995)</td>
<td>Canada</td>
<td>12</td>
<td>Mean = 3.62 years</td>
<td>44.80 (8.42)</td>
<td>22.68 (4.39)</td>
<td>22.07 (5.2)</td>
</tr>
<tr>
<td><strong>PTSD diagnosed group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accident phobia group</td>
<td>Canada</td>
<td>13</td>
<td>Mean = 3.62 years</td>
<td>40.78 (10.56)</td>
<td>19.42 (5.14)</td>
<td>21.51 (5.93)*</td>
</tr>
<tr>
<td>Brom, Kleber, &amp; Hofman (1993)</td>
<td>The Netherlands</td>
<td>151</td>
<td>1 month</td>
<td>19.5 (-)</td>
<td>10.7 (-)</td>
<td>7.8 (-)</td>
</tr>
<tr>
<td><strong>Dutch Version IES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conlon, Fahy, &amp; Conroy (1999)</td>
<td>Ireland</td>
<td>40</td>
<td>3 - 14 days Mean = 7 days</td>
<td>31.9 (18.6)</td>
<td>16.5 (9.6)</td>
<td>15.3 (10.4)</td>
</tr>
<tr>
<td>Nightingale &amp; Williams (2000)</td>
<td>United Kingdom</td>
<td>45</td>
<td>6 weeks</td>
<td>18.8 (16.1)</td>
<td>9.3 (8.4)</td>
<td>9.5 (8.9)</td>
</tr>
<tr>
<td>Bryant &amp; Harvey (1995b)</td>
<td>Australia</td>
<td>15</td>
<td>Mean = 41.2 days</td>
<td>46.73 (10.14)</td>
<td>23.80 (4.89)</td>
<td>23.00 (7.97)</td>
</tr>
<tr>
<td><strong>PTSD diagnosed group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jeavons, Greenwood, &amp; Horne (2000)</td>
<td>Australia</td>
<td>62</td>
<td>6 months</td>
<td>15.61 (16.76)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Taylor &amp; Deane (1999)</td>
<td>New Zealand</td>
<td>38</td>
<td>Mean = 9.68 yrs</td>
<td>22.92 (16.77)</td>
<td>11.50 (8.79)</td>
<td>11.90 (9.73)</td>
</tr>
<tr>
<td>Present Study Cyclists</td>
<td>New Zealand</td>
<td>27</td>
<td>Mean 5.8 months</td>
<td>18.9 (16.3)</td>
<td>10.1 (8)</td>
<td>8.8 (10.1)</td>
</tr>
</tbody>
</table>

**Note:**

* n = 14
- Not known
Table 11, below, compares the means and standard deviations from the IES scales in this study with Briere and Elliott's (1998) United States general population 'No Trauma History' sample and 'Trauma History' sample (e.g., childhood/adult sexual and physical abuse/assault, witnessing of interpersonal violence, and exposure to non-interpersonal stressors - MVAs, natural disasters). It should be noted that Briere and Elliott presented the IES in a non-specific manner. That is, individuals were asked to rate "an event that was upsetting in your life" (p. 173), in contrast, to the IES being anchored to a specific stressor (i.e., cycling accident) as in this study.

A t-test was conducted to compare the Total IES, Intrusion, and Avoidance means (18.9, 10.1, & 8.8 respectively) from the current study with the 'No Trauma History' means (8.1, 3.9, & 4.2 respectively) from Briere and Elliott (1998). This revealed significant differences (p < 0.05) in each comparison, the means in the present study being higher. A t-test was conducted to compare the Total IES, Intrusion, and Avoidance means (18.9, 10.1, & 8.8 respectively) from the current study with the 'Trauma History' means (16.7, 7.0, & 8.5 respectively) from Briere and Elliott (1998). This revealed no significant differences (p > 0.05).


<table>
<thead>
<tr>
<th>Total</th>
<th>Intrusion</th>
<th>Avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Briere &amp; Elliott (1998)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Trauma History</td>
<td>8.1</td>
<td>12.3</td>
</tr>
<tr>
<td>N = 138</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Briere and Elliott (1998)</td>
<td>16.7</td>
<td>17.9</td>
</tr>
<tr>
<td>Trauma History</td>
<td>N = 360</td>
<td></td>
</tr>
<tr>
<td>Current Study</td>
<td>18.9</td>
<td>16.3</td>
</tr>
<tr>
<td>N = 27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4.2.4 Cycling Accident Fear Questionnaire (CAFQ)

Table 12. Number of Participants Reporting "Yes" to CAFQ Items 1 - 11

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>Number Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. During the accident did you fear for your life?</td>
<td>27 12</td>
</tr>
<tr>
<td>2. During the accident did you see anyone injured?</td>
<td>27 1</td>
</tr>
<tr>
<td>3. During the accident did you lose consciousness?</td>
<td>25 2</td>
</tr>
<tr>
<td>4. Do you have nightmares about the accident?</td>
<td>27 7</td>
</tr>
<tr>
<td>5. Are you nervous before cycling trips?</td>
<td>27 11</td>
</tr>
<tr>
<td>6. Are you nervous before car or other motorised travel?</td>
<td>27 8</td>
</tr>
<tr>
<td>7. Do you get easily distressed while cycling?</td>
<td>26 13</td>
</tr>
<tr>
<td>8. Do you get easily distressed in the car or other types of transport</td>
<td>27 5</td>
</tr>
<tr>
<td>9. While in a car do you tell the driver what to do?</td>
<td>27 12</td>
</tr>
<tr>
<td>10. Do you cycle less than you used to?</td>
<td>27 13</td>
</tr>
<tr>
<td>11. Do you drive less than you used to?</td>
<td>24 3</td>
</tr>
</tbody>
</table>

Note: Where the number responding is less than 27, this signifies missing data, or that the participant did not know, or more generally, that the item was not applicable. For example, some of the cyclists did not drive; therefore, item 11 did not apply.

Table 12, above, describes the number of participants who responded positively to items 1 -- 11 on the CAFQ. Of note, 12 participants reported that they feared for their life during the accident. Seven reported having nightmares about their accident and 11 reported currently feeling nervous before cycling. Thirteen also noted being easily distressed while cycling. Overall, almost half (13) of the sample reported that they cycle less than they used to. Three participants also indicated that they also drive less than they did in the past.
Table 13. Participant Response Distribution on the CAFQ Items 12—22

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>Not Applicable*</th>
<th>Never Avoid It</th>
<th>Rarely Avoid It</th>
<th>Sometimes Avoid It</th>
<th>Often Avoid It</th>
<th>Always Avoid It</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Cycling</td>
<td>0</td>
<td>12</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>13. Driving yourself (i.e., car or other vehicle)</td>
<td>5</td>
<td>17</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14. Being a passenger on other types of transport</td>
<td>0</td>
<td>21</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15. Cycling on certain roads</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>9</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>16. Driving on certain roads</td>
<td>4</td>
<td>14</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>17. Cycling in certain weather conditions</td>
<td>0</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>18. Driving in certain weather conditions</td>
<td>4</td>
<td>16</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>19. Hearing news of road accidents</td>
<td>0</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>20. Seeing wounds or injuries</td>
<td>0</td>
<td>17</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>21. Crossing streets alone</td>
<td>0</td>
<td>23</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>22. Riding a bus</td>
<td>1</td>
<td>25</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: 1—5 point scale
* = The item was missing or was not applicable. For example, some of the cyclists did not drive; therefore, items 13, 16, & 18, did not apply.

Table 13, above, outlines how the participants responded to the avoidance items of the CAFQ. Of note, 10 participants noted that they were avoiding cycling at least some of
the time. Seventeen participants stated that they avoided cycling on certain roads either sometimes \((n = 9)\) or often \((n = 8)\). Notably, two participants recorded that they attempted to avoid hearing about road accidents.

### 2.4.2.5 Questionnaire on Perceived Impact of Cycling Accident (QPIC)

Table 14, over, details how the participants' significant others responded to a number of items that rated the cyclists' behaviour, including avoidance of certain stimuli, and general wellbeing. Thirteen \((48\%)\) cyclists were noted by their significant others as being nervous before or during cycling, at least some of the time (i.e., sometimes, often, or always). Eleven \((41\%)\) cyclists were noted by their significant others as being on edge, irritable, or agitated before or while cycling, at least some of the time. Three \((11\%)\) cyclists were noted by their significant others as being nervous before or while driving, at least some of the time. Six \((22\%)\) cyclists were noted by their significant others as being on edge, irritable, or agitated before or while driving, at least some of the time. Nine \((33\%)\) cyclists were noted by their significant others as being nervous before or during travel as a passenger, at least some of the time.

Seven \((26\%)\) cyclists were noted by their significant others as being avoidant of cycling, at least some of the time. Seven \((26\%)\) cyclists were noted by their significant others as being avoidant of cycling near their accident scene, at least some of the time. Seventeen \((63\%)\) cyclists were noted by their significant others as being avoidant of cycling on busy roads, at least some of the time. Two \((7\%)\) cyclists were noted by their significant others as being avoidant of driving their cars near the accident site, at least some of the time. Seven \((26\%)\) cyclists were noted by their significant others as being nervous when seeing other cyclists on the road, at least some of the time.

Further, four \((15\%)\) cyclists were noted by their significant others as being avoidant of talking about their accident, at least some of the time. Nineteen \((70\%)\) of the cyclists were noted by their significant others as being able to discuss their accident without distress, at least some of the time. Ten \((37\%)\) cyclists were noted by their significant others as being distressed or upset when discussing their accident, at least some of the time.
Table 14. Response Distribution by Significant Others on the QPIC

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DK/NA*</th>
<th>NEVER</th>
<th>RARELY</th>
<th>SOMETIMES</th>
<th>OFTEN</th>
<th>ALWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does he/she show any signs of being nervous before or during cycling?</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>2. Does he/she show any signs of being on edge, irritable, or agitated before or while he/she is cycling?</td>
<td>1</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3. Does he/she appear nervous before or while driving a car, etc (e.g., motorcycle)?</td>
<td>5</td>
<td>12</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Does he/she appear on edge, irritable, or agitated before or while he/she is driving a car, etc?</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4. Does he/she appear nervous before or during travel as a passenger (e.g., car, bus, motorcycle)?</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5. Does he/she avoid cycling?</td>
<td>1</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6. Does he/she avoid cycling near the scene of their accident?</td>
<td>3</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>7. Does he/she avoid cycling on busy roads?</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>8. Does he/she avoid driving a car, etc. near the scene of their cycling accident?</td>
<td>5</td>
<td>15</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9. Does he/she avoid talking about the accident?</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10. Does he/she discuss the accident without distress?</td>
<td>0</td>
<td>19</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>11. Does he/she appear distressed or upset when discussing the accident?</td>
<td>0</td>
<td>8</td>
<td>9</td>
<td>4</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>12. Has he/she had difficulty with sleeping since their accident?</td>
<td>0</td>
<td>12</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13. Has he/she had difficulty with eating since their accident?</td>
<td>0</td>
<td>25</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14. Has he/she shown any signs of being down or depressed since their accident?</td>
<td>0</td>
<td>11</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>15. Has he/she shown any signs of being more than normally irritable or angry since their accident?</td>
<td>0</td>
<td>12</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>16. Has he/she shown any signs of being more than normally anxious or nervous since their accident?</td>
<td>0</td>
<td>9</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>17. Is he/she generally in a happy or good mood since their accident?</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>16</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: 1 - 5 point scale
* = The item was missing, was not applicable, or respondent did not know a rating for the item.
Seven (26%) cyclists were noted by their significant others as having difficulty sleeping since their accident, at least some of the time. All but two cyclists were noted by their significant others as never having difficulty with eating since their accident, and the remaining two (7%) experienced eating difficulties only rarely. Seven (26%) cyclists were noted by their significant others as being depressed since their accident, at least some of the time. Five (19%) cyclists were noted by their significant others as being more irritable or more angry, than normal, since their accident, at least some of the time. Six (22%) cyclists were noted by their significant others as being more anxious or nervous, than normal, since their accident, at least some of the time. Lastly, 22 (81%) cyclists were noted by their significant others as generally being happy or in a good mood since their accident, at least some of the time.

2.4.3 Information Gathered from the Cycling Accident Interview (CAI)
The CAI generated a substantial amount of information concerning the participants’ cycling accidents. The following tables summarise much of the information that was gained.

2.4.3.1 Ratings of Injury:
All the participants reported some level of injury. Table 15, reports the range of injuries suffered by the participants. Further, it reports hours spent in hospital and days missed at work or school because of injury, if known. Fifteen participants were classified with moderate or above injuries, including five with severe injuries. Thirteen of the participants noted that they were still experiencing some degree of pain or discomfort at the time of the interview. There was no reported incidence of injury to anyone other than the cyclists.

2.4.3.2 Blow to Head, Loss of Consciousness, Drop in Concentration, & Headaches:
Table 16 shows which participants reported a blow to the head and/or loss of consciousness during their cycling accident. Further, the table notes who reported an initial drop in their concentration in the days following the accident and at the interview. Lastly, it reports those who attribute having headaches as a result of their accident.
Twelve participants reported a blow to the head and two participants were unsure about this query. Only one participant noted being unconscious at the time of their accident which they reported lasting a maximum of two minutes. Two others were unsure if they lost consciousness. Eleven participants noted that they experienced a drop in their concentration levels in the days following the accident. When asked to rate the drop of their concentration on a zero ('not at all') to 10 ('totally unable to concentrate') scale, their responses ranged from one to 10. A mean concentration drop of 5.5 was recorded for these participants. Further, four of them went on to state that they were still experiencing difficulty with their concentration. Lastly, three participants reported that they experienced headaches as a result of their cycling accident.
Table 15. Ratings of Injury

<table>
<thead>
<tr>
<th>ID #</th>
<th>Very Minor</th>
<th>Minor</th>
<th>Moderate</th>
<th>Severe</th>
<th>Days Off Work/School</th>
<th>Noted Presence of Pain/Discomfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>X</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td></td>
<td>X (5)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td></td>
<td>X (1)</td>
<td></td>
<td>4</td>
<td>X (3 mths.)</td>
</tr>
<tr>
<td>6</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>X</td>
<td></td>
<td>X (3)</td>
<td></td>
<td></td>
<td>X (7 mths.)</td>
</tr>
<tr>
<td>9</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>45</td>
<td>X (6 mths.)</td>
</tr>
<tr>
<td>10</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>7</td>
<td>X (4 mths.)</td>
</tr>
<tr>
<td>11</td>
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<td></td>
<td>49</td>
<td>X (8 mths.)</td>
</tr>
<tr>
<td>14</td>
<td>X</td>
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<td></td>
<td></td>
<td>X (5 mths.)</td>
</tr>
<tr>
<td>15</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>1</td>
<td>X (2 mths.)</td>
</tr>
<tr>
<td>16</td>
<td>X</td>
<td></td>
<td>X (5)</td>
<td></td>
<td>4</td>
<td>X (9 mths.)</td>
</tr>
<tr>
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<td>X</td>
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<td>X (2)</td>
<td></td>
<td></td>
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</tr>
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<td>X</td>
<td></td>
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<td></td>
<td>3</td>
<td>X (2 mths.)</td>
</tr>
<tr>
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<td>X</td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td>10</td>
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<tr>
<td>21</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>2</td>
<td>X (10 mths.)</td>
</tr>
<tr>
<td>22</td>
<td>X</td>
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<tr>
<td>23</td>
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<td></td>
<td>9</td>
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</tr>
<tr>
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<td>X</td>
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</tr>
<tr>
<td>26</td>
<td>X</td>
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<td></td>
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<td></td>
<td>X (2 mths.)</td>
</tr>
<tr>
<td>27</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>X (2 mths.)</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses, in the first four columns, represent time spent in hospital, in hours, if applicable. The second to last column reports days missed at work or school (university) due to injury. The last column notes those still experiencing pain or discomfort at the interview, numbers in parentheses note the time since their accident in months.
<table>
<thead>
<tr>
<th>ID #</th>
<th>Received Blow to Head</th>
<th>Loss of Consciousness</th>
<th>Initial Drop in Concentration</th>
<th>Rating of Concentration Drop</th>
<th>At Interview Still Experiencing Concentration Difficulty</th>
<th>Headaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>X</td>
<td>5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td></td>
<td>X</td>
<td>3</td>
<td>X (5 mths.)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>X</td>
<td>X (2 mins.)</td>
<td>X</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DK</td>
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<td></td>
<td></td>
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<td>9</td>
<td>-</td>
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<td>9</td>
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<td></td>
<td>X</td>
<td>5</td>
<td>X (6 mths.)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>X</td>
<td>4</td>
<td>-</td>
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<tr>
<td>11</td>
<td></td>
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<td></td>
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<tr>
<td>12</td>
<td>X</td>
<td>DK</td>
<td></td>
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<td></td>
<td></td>
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<td>-</td>
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<tr>
<td>14</td>
<td>DK</td>
<td>DK</td>
<td></td>
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<td></td>
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<tr>
<td>15</td>
<td></td>
<td></td>
<td>X</td>
<td>6</td>
<td>X (2 mths.)</td>
<td></td>
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<tr>
<td>16</td>
<td></td>
<td></td>
<td>X</td>
<td>4</td>
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<td></td>
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<tr>
<td>21</td>
<td></td>
<td></td>
<td>X</td>
<td>9</td>
<td>X (10 mths.)</td>
<td>X</td>
</tr>
<tr>
<td>22</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>23</td>
<td></td>
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<td></td>
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<tr>
<td>24</td>
<td>X</td>
<td></td>
<td>X</td>
<td>10</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>25</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>26</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>27</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Numbers in parentheses, in the 'Loss of Consciousness' column, represent time spent unconscious, in minutes, as reported by the participant. DK = Do Not Know (i.e., participant did not know) The second to last column notes those still experiencing concentration difficulties at the interview; numbers in parentheses note the time since their accident in months.
2.4.3.3 Reported Thoughts/Feelings of Fear, Helplessness, Danger, & Threat to Life:

Table 17, over, outlines which of the participants reported being fearful or afraid, feeling helpless, feeling in danger, and/or thinking they may die at the time of their accident. Participants were asked if they experienced any of the above mentioned thoughts and feelings during their accident. If they affirmed that they did experience any of them, they were then asked to rate the intensity of that feeling or thought on a zero to 100 rating scale. Zero was at the lower end of the scale indicating no intensity (e.g., no fear) and 100 was at the top end of the scale indicating extreme intensity (e.g., intensely fearful).

Twenty-one (78%) of the participants reported that they felt fearful during or immediately after their cycling accident. The lowest rating given was 35, the highest was 100, and the mean was 80. Twenty-four (89%) of the participants reported that they felt helpless during their cycling accident. The lowest rating given was 40 (note participant 3 chose not to rate this item), the highest was 100, and the mean was 79. In regard to thoughts of danger, 24 (89%) of the participants noted that they felt in danger during their cycling accident. The lowest rating given was 20, the highest was 100, and the mean was 79. Lastly, 12 (44%) of the participants reported that they thought they might die as a result of their cycling accident. The lowest rating given was 40, the highest was 100, and the mean was 78.

2.4.3.4 Legal Issues:

None of the participants reported receiving an infringement notice or fine for their part in their accident. However, five of the cyclists (participants: 3, 5, 13, 20, & 24) noted that the drivers of the vehicles involved in their accidents received an infringement notice or a fine. Further, participants 3, 13, 20, and 24 stated that further charges had been laid against these drivers.

None of the participants noted being under the influence of drugs or alcohol during their crash. When asked about the vehicle drivers’ status, in regard to drug or alcohol use, 15 cyclists reported that they believed the driver involved in their accident was not intoxicated and 12 cyclists reported that they did not know.
Table 17. Fear, Helplessness, Danger, & Threat to Life

<table>
<thead>
<tr>
<th></th>
<th>FELT FEARFUL or AFRAID</th>
<th>Rating</th>
<th>FELT HELPLESS</th>
<th>Rating</th>
<th>FELT in DANGER</th>
<th>Rating</th>
<th>THREAT to LIFE</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>yes</td>
<td>75</td>
<td>yes</td>
<td>100</td>
<td>yes</td>
<td>55</td>
<td>yes</td>
<td>40</td>
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<td>80</td>
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<td>3</td>
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<td>yes</td>
<td>*</td>
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</tr>
<tr>
<td>5</td>
<td>yes</td>
<td>90</td>
<td>yes</td>
<td>100</td>
<td>yes</td>
<td>100</td>
<td>no</td>
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<tr>
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<tr>
<td>7</td>
<td>no</td>
<td></td>
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Note: * = Participant chose not to quantify this item on the rating scale.
2.4.3.5 Control, Responsibility, & Blame:

Participants were asked ‘How much control’ they felt during their accident. They were asked to rate it on a zero to 100 rating scale (i.e., 0 = no control; 100 = complete control). They were also asked their level of responsibility in the accident (i.e., 0 = none; 100 = complete responsibility). They were asked to rate the blame the attributed to the driver of the vehicle involved (i.e., 0 = none; 100 = complete blame). Lastly, they were queried if there were any weather conditions or mechanical failures that were partly responsible and, if so, what percent of responsibility they attributed to it (i.e., 0 = none; 100 = complete responsibility). Table 18, over, details participants’ responses to the above mentioned issues.

Twenty-six (96%) participants reported their level of control, and one (4%) participant (participant 3) chose not to quantify this item. Seventeen (63%) participants rated their level of control at zero. The highest rating given was 80. Overall, the mean response was 11/100. In regard, to the cyclists’ reported level of responsibility in their accidents, the mean for the 27 cyclists was 19/100, with 16 (59%) participants stating no level of responsibility. Two (7%) cyclists admitted complete responsibility (participants 1 & 6).

Twenty-one (78%) cyclists placed a 100 rating for complete blame on the driver involved in their accident, two (7%) reported zero rating for blame, and the mean was 87. Overall, 23 (85%) of the cyclists rated blame on the driver at 80 or above. In other words, only four participants failed to attribute substantial levels of blame, of these, two selected zero blame (participants 1 & 6) and two others, participants 9 and 23, reported blame ratings of 20 and 70 respectively. Lastly, six (22%) participants acknowledged that either weather conditions or mechanical failures contributed to the accident. However, these ratings tended to be low, with a mean of 25.
Table 18. Control, Responsibility, & Blame

<table>
<thead>
<tr>
<th>ID #</th>
<th>CYCLIST'S CONTROL</th>
<th>CYCLIST'S RESPONSIBILITY</th>
<th>BLAME ATTRIBUTED TO DRIVER</th>
<th>WEATHER or MECHANICAL CONTRIBUTORS</th>
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</tr>
<tr>
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<td>20.000</td>
<td>0.000</td>
<td>100.000</td>
<td>Yes (2%) Overcast &amp; dark</td>
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<tr>
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<td>*</td>
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</tr>
<tr>
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<td>Yes (100%) Wet &amp; icy</td>
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<td>Yes (20%) Sunlight in driver's view</td>
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<td>100.000</td>
<td>Yes (5%) Slightly icy</td>
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</tr>
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<td>100.000</td>
<td>Yes (5%) Sunlight in driver's view</td>
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<td>Yes (20%) Overcast, poor visibility</td>
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</tbody>
</table>

Ratings: 0 = no control; no responsibility; or no blame 100 = complete control; complete responsibility; or complete blame

Note: * = Participant chose not to quantify this item on the rating scale. Percentage in parentheses indicates the amount of responsibility attributed to these conditions.
2.4.3.6 Previous Accidents:
Participants were asked about previous involvement in both cycling accidents and motor vehicle accidents. Table 19 reports responses to these queries. Fourteen (52\%) participants noted previous cycling accidents and 12 (44\%) noted previous MVAs.

Table 19. Previous Accidents

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<th>PREVIOUS CAR ACCIDENTS</th>
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</table>

*Note: *= Participants also have each had an additional accident, i.e., they presented with two recent cycling accidents as opposed to one.
2.4.3.7 Current Life Stress & Previous Psychological History:
Participants were asked if they had any history of psychological difficulties or illness, as well as if they were currently experiencing any other stressors apart from accident-related issues. Table 20, over, outlines their responses, however, particulars about previous psychological difficulties and current stressors are discussed under each participant's case report (see Case Reports section to follow). Overall, eight (30%) participants noted previous psychological difficulties and 14 (52%) reported current stressors.
Table 20. **Current Life Stress & Previous Psychological History**

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</tr>
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<td>No</td>
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<td>Yes (Mood)</td>
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<tr>
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<td>Yes</td>
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<td>Yes (Mood)</td>
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*Note:* noted in parentheses is the type of psychological disorder reported by the participant.

### 2.4.3.8 Current Road Use; Ratings of Vulnerability:

Participants were asked if they currently felt vulnerable when cycling and, if so, were asked to place a rating on it from zero to 100 (i.e., 100 = intensely vulnerable). They were also asked to rate their feelings of vulnerability concerning driving and as a passenger in a car. Table 21, to follow, outlines the participants’ responses. Some of
the participants were unable to place a rating on their vulnerability when driving because they do not drive or drive very infrequently.

Twenty-four (89%) of the cyclists reported that they currently feel vulnerable when cycling. Of the remaining three cyclists, one reported he did not feel vulnerable, one did not cycle due to being cycle phobic, and the third had no cycle (but placed a hypothetical rating of 60 on perceived vulnerability). Thus, 23 (85%) cyclists (one cyclist, participant 3, chose not to use the rating scale) placed ratings on their current feelings of vulnerability while cycling. The ratings ranged from 15 to 100, with a mean of 55.

Nineteen (70%) cyclists responded to rating their vulnerability as drivers of vehicles. The minimum rating was zero and the highest was 40, with a mean of nine. Twenty-six (96%) of the participants rated their feelings of vulnerability while being a passenger. The lowest rating was zero and the highest was 100, with a mean of 24.
Table 21. Current Ratings of Vulnerability

<table>
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<tr>
<th>ID #</th>
<th>VULNERABLE on CYCLE</th>
<th>VULNERABLE on CYCLE (rating)</th>
<th>VULNERABLE in CAR (rating)</th>
<th>VULNERABLE as a PASSENGER (rating)</th>
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<td>5</td>
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<td>75</td>
<td>DD</td>
<td>75</td>
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<tr>
<td>27</td>
<td>yes</td>
<td>20</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

Note: * = Participant chose not to quantify this item on the rating scale.

DD = Participant does not drive or drives infrequently.
2.4.3.9 Cycling Behaviour:

Participants were asked if they had avoided a number of conditions or had restricted certain activities in the month after their accident (T1), as well as, for the current period (T2) at the interview. Table 22, to follow, outlines participants’ responses to the five of these conditions for both times. The five conditions listed are: ‘Cycling at Night’, ‘Cycling in the Rain’, ‘Cycling on Busy Roads’, Cycling Near the Accident Site’, and ‘Other’ (i.e., other activities that they restricted that they believed were related to the accident). Further, the total number of conditions avoided, as noted in the CAI (not all shown in Table 22), is given for both times.

Twelve (44%) cyclists reported avoiding cycling at night at T1. This, however, dropped to seven (26%) at T2. Ten (37%) cyclists reported avoidance of cycling in the rain at T1. This dropped to seven (26%) at T2. Eighteen (67%) cyclists noted avoidance of cycling on busy roads at both T1 and T2. However, three participants who noted avoidance at T1 dropped to non-avoidance at T2. Further, two other participants moved from non-avoidance at T1 to avoidance at T2 and an additional participant who only began cycling at T2, was classed avoidant (was classed non-applicable at T1 due to injury).

Fourteen (52%) cyclists stated they avoided cycling near the accident site at T1. This figure dropped to nine (33%) at T2. This, like the responses to cycling on busy roads, was not as straight forward as the same cyclists moving from avoidance to non-avoidance. Instead, seven remained the same at both T1 and T2, three moved from avoidance to ‘non-applicable’ (they had moved away from the accident site), and four dropped to non-avoidance. At T2, one who went from non-avoidance to avoidance added to the seven non-moving cyclists and an additional participant who only began cycling at T2 and at that period was classed as avoidant (having been classified as non-applicable at T1 due to injury).

Lastly, at T1 three (11%) cyclists stated that they were restricting activities due to their accident. One cyclist avoided going to socialise at his local tavern, as it was associated with the site of his accident. Another cyclist avoided a substantial number
of social and leisure activities because most of her friends cycled and thus their activities revolved around cycling, which she was reluctant to participate in. The third cyclist avoided getting into others’ vehicles in the month after her cycling accident.

At T2, four (15%) cyclists noted that they were restricting activities that they associated with their accident. None of these four cyclists were any of the three cyclists noted at T1 to be avoidant or restrictive of activities. One cyclist reported avoiding difficult road conditions such as roundabout intersections, especially if they were busy. Another cyclist noted avoiding cycling in poor light, especially on rural roads where he liked to train. Two other cyclists reported that they had curtailed their social lives as socialising meant having to get to and from events by their cycles, which they were hesitant to use.

In regard to the total number of stimuli avoided (note, not all the stimuli/conditions queried about in the CAI are presented in Table 22), overall, there were 21 (78%) participants who noted avoidance in the month after their accident (T1). Responses for the 27 participants ranged from zero to seven. The mean for the 21 who noted avoidance was 3.09. At the interview (T2), 20 (74%) participants noted avoidance. However, two of those who noted avoidance at T1 had dropped to zero at T2 and, in contrast, one participant had gone from no avoidance at T1 to avoidance at T2. At T2 responses for the 27 participants ranged from zero to six, the mean for the 20 who noted avoidance was two 2.4.

Five (19%) participants remained non-avoidant at both T1 and T2. For the remaining 22 (81%), who were avoidant at either T1 or T2, or both, the following was found: thirteen (59%) participants, out of the 22, decreased the number of avoided conditions between T1 and T2, six (27%) remained at the same number of avoided conditions at both T1 and T2, and three (14%) increased the number of avoided conditions between T1 and T2.
Table 22. Stimuli Avoided at 1-month Post-Accident & Currently

<table>
<thead>
<tr>
<th>ID #</th>
<th>Cycling at Night</th>
<th>Cycling in the Rain</th>
<th>Cycling on Busy Roads</th>
<th>Cycling Near Accident Site</th>
<th>Restrict Other</th>
<th>Total Avoided</th>
</tr>
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<tbody>
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<td>Y</td>
<td>Y</td>
<td>N</td>
<td>4</td>
</tr>
<tr>
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<td>Y</td>
<td>Y</td>
<td>N</td>
<td>4</td>
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<td>N</td>
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<td>Y</td>
<td>N</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<td>1</td>
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<td>N/A</td>
<td>N/A</td>
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<td>1</td>
</tr>
<tr>
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<td>N/A</td>
<td>N/A</td>
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<td>1</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
</tr>
<tr>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y a</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y b</td>
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<td>Y</td>
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<td>Y</td>
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<tr>
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<td>Y</td>
<td>Y</td>
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</tr>
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<td>N</td>
<td>Y</td>
<td>N</td>
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</tr>
<tr>
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<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>7</td>
</tr>
<tr>
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<td>N/A</td>
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</tr>
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<td>Y</td>
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</tr>
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<td>Y</td>
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<td>N/A</td>
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<td>N/A</td>
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<td>N</td>
<td>2</td>
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<td>25</td>
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<td>N/A</td>
<td>N/A</td>
<td>N</td>
<td>0</td>
</tr>
<tr>
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<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>27</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>3</td>
</tr>
</tbody>
</table>
Key for Table 22.

- White background indicates the one-month period after the accident (T1).
- Grey background indicates the current period (T2), that is, at the interview.

N/A = Not applicable

a. Avoided socialising at tavern associated with accident site.
b. Avoided getting into others' vehicles.
c. Avoided social activities as they included cycling.
d. Avoided difficult road intersections (e.g., roundabouts).
e. Avoided poor weather or light conditions.
f. Avoided social activities as transportation to and from involved cycling.
g. Avoided social activities as transportation to and from involved cycling.
Table 23, to follow, outlines the frequency of anxiety reported by the participants at one-month post accident (T1) and at the interview (T2). The five conditions listed are: ‘Cycling at Night’, ‘Cycling in the Rain’, ‘Cycling on Busy Roads’, ‘Cycling Near the Accident Site’, and ‘Other’ (i.e., other conditions where anxiety is noted to occur).

In regard to cycling at night, at T1, nine cyclists reported that this item was not applicable to them. Therefore, of the remaining 18 participants, the following was found. Six (6/18; 33%) avoided, nine (9/18; 50%) noted anxiety some of the time or more often (i.e., sometimes, often, or always), and three (3/18; 17%) reported very little anxiety (i.e., rarely or never). At T2, ten cyclists reported that this item was not applicable to them. Thus, from the remaining 17, four (4/17; 24%) avoided, six (6/17; 35%) noted anxiety some of the time or above, and seven (7/17; 41%) reported very little anxiety (i.e., rarely or never). Between T1 and T2, 16 cyclists remained at the same level of anxiety, six cyclists decreased in anxiety, two increased in anxiety, and three were uninterpretable due to being classified as non-applicable at either T1 or T2.

In regard to cycling in the rain, at T1, eight cyclists reported that this item was not applicable to them. Therefore, of the remaining 19 participants, the following was found. Five (5/19; 26%) avoided this, eight (8/19; 42%) noted anxiety some of the time or more often, and six (6/19; 32%) reported very little or no anxiety. At T2, seven cyclists reported that this item was not applicable to them. Thus, from the remaining 20, three (3/20; 15%) avoided, nine (9/20; 45%) noted anxiety some of the time or above, and eight (8/20; 40%) reported very little or no anxiety. Between T1 and T2, 21 cyclists remained at the same level of anxiety, five cyclists decreased in anxiety, and one was uninterpretable due to being classified as non-applicable at T1.

Concerning cycling on busy roads, at T1, three cyclists reported that this item was not applicable to them. Therefore, of the remaining 24 participants, the following was found. Five (5/24; 21%) avoided, 15 (15/24; 63%) noted anxiety some of the time or more often, and four (4/24; 17%) reported very little or no anxiety. At T2, one cyclist reported that this item was not applicable to them. Thus, from the remaining 26, two
(2/26; 8%) avoided, 20 (20/26; 77%) noted anxiety some of the time or more often, and four (4/26; 15%) reported very little or no anxiety. Between T1 and T2, 14 cyclists remained at the same level of anxiety, eight cyclists decreased in anxiety, three increased in anxiety, and two were uninterpretable due to being classified as non-applicable at either T1 or T2.

In regard to cycling near the accident site, at T1, three cyclists reported that this item was not applicable to them. Therefore, of the remaining 24 participants, the following was found. Eight (8/24; 33%) avoided, 10 (10/24; 42%) noted anxiety some of the time or more often, and six (6/24; 25%) reported very little or no anxiety. At T2, six cyclists reported that this item was not applicable to them. Thus, from the remaining 21, four (4/21; 19%) avoided, 11 (11/21; 52%) noted anxiety some of the time or more often, and six (6/21; 29%) reported very little or no anxiety. Between T1 and T2, eight cyclists remained at the same level of anxiety, 10 cyclists decreased in anxiety, two increased in anxiety, and seven were uninterpretable due to being classified as non-applicable at either T1 or T2.

Concerning other conditions where anxiety was noted, at T1, 10 cyclists reported that this item was not applicable to them. Therefore, 17 participants reported anxiety in a number of other conditions. At T2, 17 cyclists also noted anxiety in other conditions. However, one of the cyclists reporting anxiety at T1 did not report anxiety and T2 and, in contrast, one of the cyclists not reporting anxiety at T1, reported anxiety at T2. Thus, 16 cyclists noted anxiety both at T1 and at T2, with two others noting anxiety at either T1 or T2 but not at both. The conditions that anxiety was noted in were strongly associated with the cyclists' accidents. A description of these conditions is given in the table's key.
<table>
<thead>
<tr>
<th>ID #</th>
<th>Cycling at Night</th>
<th>Cycling in the Rain</th>
<th>Cycling on Busy Roads</th>
<th>Cycling Near Accident Site</th>
<th>Other Conditions Anxiety is Noted</th>
</tr>
</thead>
<tbody>
<tr>
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<td>N/A</td>
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<tr>
<td>2</td>
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<td>Avoid</td>
<td>N/A</td>
</tr>
<tr>
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<tr>
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<td>Never</td>
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<td>Some</td>
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</tr>
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</tr>
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<td>Some</td>
<td>Always</td>
<td>Some</td>
</tr>
</tbody>
</table>
Key for Table 23.

- White background indicates the one-month period after the accident (T1).
- Grey background indicates the current period (T2), that is, at the interview.

N/A = Not applicable

a Anxious when discussing accident with parents at T1 and at T2 anxious when seeing other cyclists on the road.
b Anxious at T1 & T2 when seeing other cyclists on the road and anxious around time of the day that the accident occurred (i.e., late afternoon when roads are busy).
c Anxious at T1 & T2 at roundabouts, note accident occurred at a roundabout.
d Anxious at T1 & T2 when cycling near car doors and buses, note accident involved a bus.
e Anxious at T1 & T2 when cycling near car doors and when seeing other cyclists on the road, note accident involved a collision with an opened car door.
f Anxious at T1 & T2 when seeing other cyclists on the road.
g Anxious at T1 & T2 when seeing her young niece cycling near the road/footpath.
h Anxious at T1 & T2 when sitting in a car, as either driver or passenger, at intersections.
i Anxious at T1 & T2 when seeing other cyclists on the road that she perceived to be in danger.
j Anxious at T1 & T2 when seeing other cyclists on the road.
k Anxious at T1 & T2 when cycling and a car is approaching from behind.
l Anxious at T2 when seeing other cyclists on the road, not noted at T1.
m Anxious at T1 & T2 when cycling near car doors, note accident involved a collision with an opened car door.
n Anxious at T1 that a car would pull out in front of her as had occurred in the accident.
o Anxious at T1 & T2 around time of the day that the accident occurred (i.e., late afternoon when roads are busy).
p Anxious at T1 & T2 at roundabouts, note accident occurred at a roundabout.
q Anxious at T1 about his two young children cycling. At T2 noted being anxious near busy roads.
r Anxious at T1 & T2 about his young son cycling. At T2 noted being anxious if cycling in fog/poor visibility.
2.4.4 Predictors of IES Scores

A logistic regression analysis was performed to determine the significance of the contribution of a number of factors towards IES scores. That is, the participant’s IES scores were placed into two groups, Low (< 20; n = 17) versus Moderate (20 – 29; n = 4) and High (≥ 30; n = 6). Note, the Moderate and High IES scorers were combined into one group (> 20; n = 10). The variables tested for significance as predictors of IES scores were: injury severity (i.e., very minor, minor, moderate, & severe); feared for life during cycling accident (i.e., Yes or No); and felt no sense of control in cycling accident (i.e., Yes or No). (See Table 25, to follow, which outlines participants’ IES scores, injury severity, and so forth).

The results are displayed in Table 24, over, as adjusted odds ratios, with corresponding 95% confidence intervals. Howell (1997) reported the following in regard to odds ratios, “A useful statistic, especially for 2 X 2 tables, that makes clear the degree to which one variable influences another is the odds ratio” (p. 159). All factors included in the analysis were simultaneously controlled for. The variables noted (severity of injury, feared for life, & loss of control) were not able to be used to significantly predict IES outcome in this study. However, of note, odds ratios for these data indicated that cyclists that perceived a loss of control in their accident were one-and-one-half times more likely to have a moderate to high IES score than those who did not note a loss of control, although this did not reach significance.
Table 24. **Summary of Multivariate Analysis**

<table>
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<tr>
<th>Factor</th>
<th>Severity of Injury:</th>
<th>Moderate Low IES (n)</th>
<th>Moderate High IES (n)</th>
<th>Odds Ratio</th>
<th>95% Lower Confidence Interval</th>
<th>95% Upper Confidence Interval</th>
</tr>
</thead>
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<td></td>
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<td>.215</td>
<td>.018</td>
<td>2.618</td>
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<tr>
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<td>Minor</td>
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<td>2</td>
<td>.640</td>
<td>.035</td>
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</tr>
<tr>
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2.4.5 Brief Participant Findings

Table 25, over, presents an overview of the findings in this study. Further, it notes those who had high or moderate IES scores.
Table 25. Brief Participant Findings

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<tr>
<th>ID #</th>
<th>Age</th>
<th>Gender</th>
<th>Time Since CA</th>
<th>Injury</th>
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<th>IES Avoidance</th>
<th>IES Total</th>
<th>DASS Depression</th>
<th>DASS Anxiety</th>
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Note: Unless otherwise specified, IES & DASS scores were in the Low or Normal range, respectively.
1 Feared for life, either a 'yes' on the CAFQ item or noted threat to their life in the CAI.
2 Reported no amount (0 %) of control in the CAI.

- High IES Score
- Moderate IES Score
2.5 CASE REPORTS

This section presents brief case reports on the participants involved in this study. While the reports are not exhaustive, they endeavour to outline the accident and its subsequent influence on the cyclist involved. Rather than repeating all of the data and information gathered from the participants, the case reports present an amalgamation of both qualitative and quantitative findings. Further, points of interest or significance noted in the interview sessions are reported.

Participant 1 (A):

A is a 22-year-old female of New Zealand-European ethnicity. She was making a right turn and was hit by an oncoming car. She sustained minor injuries, such as grazing to one of her wrists and heavy bruising to her legs, which required first aid only. This led to missing one day’s academic work.

On the IES, A was in the Low subgroup with a Total IES score of 6. Her Intrusion score was 6 and her Avoidance score was 0. On the DASS, her Depression score (6) was in the Normal range, Anxiety score (8) was in the Mild range, and Stress score (8) was in the Normal range.

On the CAFQ, A noted the following on the accident profile (first 11 items). She noted fearing for her life during the accident; that she is currently nervous before cycling and car travel; that she is easily distressed while cycling; and that she now cycles less. On the avoidance items, A noted that she was at times avoiding cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by A’s significant other. A, at times, appears on edge, irritable, or agitated before cycling; nervous as a car passenger; and avoids cycling on busy roads. Her significant other noted that the cycling accident has discouraged A from learning to drive.

The interview, at three months post-accident, revealed a number of issues of importance. A reported avoiding a number of situations following her accident. Of note, she reported that she avoided getting her cycle repaired so she would not have to
cycle. She further added that she currently tries to be more observable when cycling and a safer cyclist. She recounted being under some stress at the time of the accident that was related to academic examinations. She reported that she felt responsible for the accident and stated that she felt like it was "fate". That is, she believed that the accident was not a coincidence but that she had in some way "directed fate" to result in the accident.

**Participant 2 (B):**

B is a 20-year-old female of New Zealand-European ethnicity. She was hit by a car travelling in the same direction, which turned left in front of her, cutting off her path of travel. She sustained *very minor* injuries, such as a sprained wrist, which required no medical attention. B reported anger at the driver who only stopped briefly to lean out of his window to ask if she was hurt, and then drove off.

On the IES, B was in the *Low* subgroup with a Total IES score of 14. Her Intrusion score was 10, which is significant as it falls in the *Moderate* range. Her Avoidance score was 4, placing her in the *Low* range. On the DASS, her Depression score (0) was in the *Normal* range, Anxiety score (1) was in the *Normal* range, and Stress score (7) was in the *Normal* range.

On the CAFQ, B noted the following on the accident profile (first 11 items). She reported being easily distressed while cycling; telling the driver what to do; and cycling less than she used to. On the avoidance items, the following were of interest. She reported often avoiding cycling, avoiding cycling on certain roads, avoiding driving on certain roads, and avoiding cycling in certain weather conditions. In addition, B reported, at times, avoiding driving herself in a car, avoiding driving in certain weather conditions, and avoiding seeing wounds or injuries.

On the QPIC, the following items were noteworthy as reported by B's significant other. B appears to often avoid cycling on busy roads and avoids talking about her accident. Further, at times, she appears nervous before cycling; on edge, irritable or agitated while driving a car; avoids cycling; avoids cycling or driving near the
accident site; and nervous when seeing other cyclists on the road. It was noted that she sometimes seems more anxious or nervous than before the accident.

The interview, at five months post-accident, revealed a number of issues of importance. She reported avoiding a number of situations following her accident. Interestingly, she stated that she moved closer to her place of work and study (university) so she could walk or bus rather than having to use her cycle. She noted some stress at work at the time of the accident and described a previous frightening cycling experience, five months earlier, where a truck pulled out in front of her, which she only just missed colliding with. Overall, B placed complete blame on the driver involved in the accident. She noted anger resulting from the accident and that she feels if drivers are careless then they should not be allowed to drive. She added that the lack of control she felt during the accident makes her currently feel helpless at times.

Participant 3 (C):
C is a 44-year-old male of European ethnicity. He collided with a car door when the car’s occupant opened it without seeing him. He sustained moderate injuries, such as a chunk out of his finger, a gash to his left leg that required stitches, and severe bruising to the left side of his body. These injuries resulted in missing one day’s work.

On the IES, C was in the Low subgroup with a Total IES score of 6. His Intrusion score was 6 and his Avoidance score was 0. On the DASS, his Depression score (5) was in the Normal range, Anxiety score (4) was in the Normal range, and Stress score (8) was in the Normal range.

On the CAFQ, C noted the following on the accident profile. He noted fearing for his life during the accident, that he has nightmares about the accident, that he is currently nervous before cycling and car travel, and that he tells the car driver what to do. On the avoidance items, C noted that he was at times avoiding cycling on certain roads, and avoiding cycling and driving in certain weather conditions.
On the QPIC, the following items were noteworthy as reported by C’s significant other. It was noted that C is often nervous before cycling and often avoids cycling on busy roads. Further, at times, C appears on edge, irritable, or agitated before cycling; nervous as a car passenger; avoids cycling near the scene of his accident; and has, at times, had difficulty with sleeping since the accident. His significant other commented that since the cycling accident, C has been more cautious when cycling.

A number of issues were noted during the interview, at five months post-accident. Of note, he reported that after the accident he “projected his anxiety” onto his partner when they were cycling. He added that the accident has motivated him to be more assertive about cycle safety, going as far as contacting the local council about the poor condition of some of the city’s roads.

He recounted being under some stress at the time of the accident that was related to work and his partner’s strain with finding employment. He reported that he believed good support from the police and a witness of the accident, aided in his recovery from the accident, “Healing [mental] aided by justice being done”.

**Participant 4 (D):**

D is a 27-year-old male of New Zealand-European ethnicity. A car failed to give way to him when he was cycling on a roundabout, he was hit side on by the front end of the car. He sustained very minor injuries, such as grazing to the left side of his body. This led to missing one day’s academic study.

On the IES, D was in the Low subgroup with a Total IES score of 11. His Intrusion score was 8 and his Avoidance score was 3. On the DASS, his Depression score (6) was in the Normal range, Anxiety score (1) was in the Normal range, and Stress score (9) was in the Normal range.

On the CAFQ, D noted nothing of significance on the accident profile or on the avoidance items. Nothing of significance was noted on the QPIC items. However, it was reported by D’s significant other, that he is now more impatient with vehicle drivers when he is cycling. Further, D’s significant other suggested that if D was in
another accident that he may not be so good-natured about it and, may in fact, react angrily.

D reported at the interview, at nine months post-accident, avoidance and anxiety related to roundabouts. He remarked that he had no recent life stressors. He reported that he believed his resilience to the accident was because he used his cycle heavily, both for recreation (recently trekked extensively within the United States) and for getting to work.

Participant 5 (E):

E is a 53-year-old male of New Zealand-European ethnicity. He was using a roundabout when an oncoming car failed to give way or slow down and hit him. He sustained moderate injuries, such as severe bruising and a strained ligament in one of his forearms. This led to missing four days of work.

On the IES, E was in the Low subgroup with a Total IES score of 5. His Intrusion score was 4 and his Avoidance score was 1. On the DASS, his Depression score (2) was in the Normal range, Anxiety score (0) was in the Normal range, and Stress score (5) was in the Normal range.

On the CAFQ, E noted the following on the accident profile. He noted fearing for his life during the accident and that he lost consciousness for a maximum of two minutes. On the avoidance items, E noted that he was, at times, avoiding cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by E's significant other. It was noted that E, at times, avoids cycling. Further, E's significant other reported that E is, at times, more than normally anxious or nervous since his accident. The interview, at three months post-accident, revealed a number of issues of importance as discussed below. E reported still having some forearm discomfort resultant from the accident. E avoided a number of situations following his accident. Of note, he reported that he is more safety conscious and vigilant for cars. He noted no significant life stressors. He remarked that the accident has made him reluctant to
get a new cycle for the rural cycle training that he does to prepare for cycle racing. Further, the accident has made him consider his age (53 years) in regard to whether or not he should continue to cycle or not.

**Participant 6 (F):**

F is a 66-year-old male of New Zealand-European ethnicity. He was cycling parallel with a bus on a roundabout when the bus turned left blocking his path of travel, resulting in a collision. He sustained *moderate* injuries, such as grazing to the left knee that was deep enough to reveal bone. Being retired meant no time was missed from work.

On the IES, *F* was in the *Low* subgroup with a Total IES score of 6. His Intrusion score was 6 and his Avoidance score was 0. On the DASS, his Depression score (6) was in the *Normal* range, Anxiety score (1) was in the *Normal* range, and Stress score (9) was in the *Normal* range.

On the CAFQ, *F* noted nothing of significance on the accident profile and on the avoidance items, he reported that he, at times, avoided cycling on certain roads. On the QPIC, *F*’s significant other noted that *F* always avoided cycling on busy roads. When interviewed, at four months post-accident, *F* reported a number of issues. *F* stated being more vigilant of buses and car doors since the accident. He noted no life stressors at the time of the accident. He reported that he currently has a growing sense of an impending accident due to the increase in traffic in Christchurch, but noted that this has not deterred him from cycling. He also reported that what remains in his mind about the accident is a vivid image of “big wheels”. He believed that this image is significant to him because a number of years ago, when cycling with a cycling club, he witnessed a female cyclist being killed when she was run over by a truck. Both accidents, he noted, involved large vehicles with large wheels.

**Participant 7 (G):**

*G* is a 21-year-old female of New Zealand-European ethnicity. She collided with a car door when it was opened in front of her. She sustained *very minor* injuries, such as light bruising and grazes, which required no medical attention.
On the IES, G was in the Low subgroup with a Total IES score of 8. Her Intrusion score was 5 and her Avoidance score was 3. On the DASS, her Depression score (6) was in the Normal range, Anxiety score (2) was in the Normal range, and Stress score (11) was in the Normal range.

On the CAFQ, G noted the following on the accident profile. She reported that she is easily distressed while cycling, and that she now cycles less. On the avoidance items, G noted that she was, at times, avoiding cycling and avoiding cycling on certain roads. She noted always avoiding cycling in certain weather conditions.

On the QPIC, the following items were noteworthy as reported by G's significant other. It was noted that G at times appears on edge, irritable, or agitated before cycling; nervous while driving; on edge, irritable, or agitated while driving; and avoids cycling on busy roads. G's significant other noted that G is often nervous before cycling; often avoids talking about the accident; and is often distressed or upset when discussing the accident. Further, G's significant other recounted that G has, at times, had sleeping difficulty since the accident and has shown signs of being down or depressed since the accident (but noted she was like this before also).

The interview, at 10 months post-accident, noted a number of important points. G reported anxiety often in association with busy roads. Of note, she reported that she gets anxious when she sees cyclists when she is driving. She recalled being under some stress at the time of the accident that was related to academic issues. She reported that she has been involved in a number of previous accidents, which she noted have ranged in severity. She noted that these accidents when they occurred were distressing and led to some road-use avoidance. Lastly, she recalled a history of depression.

Participant 8 (H):
H is a 46-year-old male of New Zealand-European ethnicity. He was hit by a car, travelling in the opposite direction, which turned in front of him, hitting him side on. He sustained severe injuries, such as two broken ribs, a deep cut to his elbow, severe bruising to his right buttock and lower back, and a badly bruised shoulder. He noted
being in excruciating pain on the way to the hospital. He spent three hours at hospital where he received stitches to his elbow and other medical attention. Despite the intensity of his injuries, he attended work the following day, but noted discomfort.

On the IES, $H$ was in the High subgroup with a Total IES score of 32. His Intrusion score was 20, placing him the High range for this score. His Avoidance score was 12, placing him in the Moderate range. On the DASS, his Depression score (7) was in the Normal range, Anxiety score (17) was in the Severe range, and Stress score (20) was in the Moderate range.

On the CAFQ, $H$ noted the following on the accident profile. He noted fearing for his life during the accident; that he has nightmares about the accident; that he is nervous before cycling, car travel, and other motorised travel; that he is easily distressed while cycling and while in the car; he tells the driver what to do; and cycles less than he used to. On the avoidance items, $H$ noted that he was at times avoiding cycling, avoiding driving on certain roads, and avoiding hearing news about accidents. He reported that he often avoids cycling on certain roads, avoids cycling in certain weather conditions, and avoids seeing injuries or wounds.

On the QPIC, the following items were noteworthy as reported by $H$'s significant other. It was noted that $H$, at times, appears on edge, irritable, agitated, or nervous when driving; is nervous before travelling as a passenger; and avoids cycling on busy roads. His significant other noted that $H$ often avoids cycling near the accident scene. Further, $H$'s significant other reported that he, at times since the accident, has difficulty sleeping and is more than normally anxious or nervous. $H$'s significant other commented that the accident occurred during a stressful period and that $H$, despite being a "very positive and strong person", feels anger towards careless driving and unnecessary traffic incidents.

When interviewed, at seven months post-accident, $H$ reported still having some elbow discomfort resultant from the accident. He reported avoiding cycling for three to four months after the accident. He recounted being under stress at the time of the accident and noted that his mother had recently been killed as a pedestrian by a car. He added
that his wife’s father had recently died, that their home had been burgled recently, and that there was some work-related stress. H recounted that he had vivid memories of falling through the air in slow motion when he was hit and seeing close by trees as he fell. He added that he has a sense of anger about the accident due to the driver not stopping when he believed the driver had seen him, and that he is annoyed because he felt he was a cautious cyclist. Lastly, he commented that he now feels overly cautious and nervous which “makes him vulnerable to more accidents”. It appears that H’s recent stressful experiences correspond with his high DASS scores.

Participant 9 (I):
I is a 28-year-old female of New Zealand-European ethnicity. She was cycling on the footpath and was struck by a car reversing out of its driveway. She sustained severe injuries, such as a chipped tooth, a swollen lip, and her collarbone was broken in two places. This led to missing three day’s work initially, followed by six weeks off when her broken collarbone was discovered few days after the accident.

On the IES, I, was in the High subgroup with a Total IES score of 49. Her Intrusion score was 15, placing her in the Moderate range. Her Avoidance score was 34, placing her in the High range. On the DASS, her Depression score (32) was in the Extremely Severe range, Anxiety score (29) was in the Extremely Severe range, and Stress score (36) was in the Extremely Severe range.

On the CAFQ, I noted the following on the accident profile. She noted fearing for her life during the accident; that she is currently nervous before cycling and car travel; that she is easily distressed while cycling and during car travel; that she tells the driver what to do; and that she now cycles less. On the avoidance items, I noted that she was, at times, avoiding cycling, avoiding being a passenger in other vehicles, and was avoiding seeing wounds or injuries. Further, she reported always avoiding cycling in certain weather conditions, avoiding crossing streets alone, and avoiding hearing news of road accidents.

On the QPIC, the following items were noteworthy as reported by I’s significant other. It was noted that I, at times, appears nervous before or during cycling and
avoids cycling on busy roads. Further, her significant other noted that I, at times, appears upset or distressed when discussing the accident and has had difficulty sleeping since the accident.

At six months post-accident, when interviewed, I revealed a number of noteworthy details. She reported still having some collarbone discomfort resultant from the accident, and reported avoiding a number of situations following her accident. Of note, she reported that she becomes anxious when seeing her niece cycling. She further commented that she currently thinks she sees cars when she is cycling, when in fact there are none. She reported that she now hears noises very acutely. She recounted having distressing dreams about all her teeth being knocked out, these dreams are at times disturbing enough to wake her. It could be argued that her current psychological distress may account for her high DASS scores.

**Participant 10 (J):**

J is a 46-year-old male of New Zealand-European ethnicity. He was hit by a car that drove through an intersection, failing to give way to him. Subsequently, he struck the car’s bonnet before rebounding onto the road. He sustained severe injuries, including a broken wrist and cuts to an ankle. Further, he received a skinned cheek, knee, and knuckles. This led to him missing a week of work.

On the IES, J was in the High subgroup with a Total IES score of 40. His Intrusion score was 25, placing him the High range for this score. His Avoidance score was 15, placing him in the Moderate range. On the DASS, his Depression score (1) was in the Normal range, Anxiety score (1) was in the Normal range, and Stress score (2) was in the Normal range.

On the CAFQ, J noted the following on the accident profile. He reported having nightmares about the accident. On the avoidance items, J noted that he was, at times, avoiding cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by J’s significant other. It was noted that J, at times, appears nervous before or during cycling and
avoids driving near the scene of his accident. Further, his significant other noted that J often appears on edge, irritable, or agitated before or while cycling. He was noted to often appear distressed or upset when discussing the accident. In addition, J's significant other reported that he, at times, has been more than normally anxious or nervous than he was before the accident.

During the interview, at four months post-accident, J reported still having some wrist discomfort resultant from the accident, and not being able to cycle much immediately after the accident due to his wrist injury. However, he did note that he was quite anxious when driving his car, especially near the accident site. He added that when he started cycling that he avoided busy roads and the accident site. Interestingly, he stated that when he now cycled near the scene of the accident, that he would use the cycle lane situated off the road. He noted that he does not usually use the cycle lane in any other situation.

J recalled that in the weeks following the accident that he would wake up from dreaming about the accident. He remarked that it was always the same dream of cycling along the same part the road and reliving the accident. He added that he continues to have a "fear of being run over from behind" when cycling. He likened the accident to being like the "roll of the dice", one of those things that happens. He rationalised that everyone he knows that cycles has been knocked off his or her cycle and that eventually anyone who cycles will be hit.

Participant 11 (K):
K is an 18-year-old female of New Zealand-European ethnicity. She was turning a corner on her cycle when a car, which was also turning, hooked the side of her cycle as it went by. The car's back wheel was on the cycle's back wheel as they turned. She managed to separate herself from the car but came off her cycle. She sustained moderate injuries, such as grazing and bruising to her ribs. The driver of the vehicle failed to stop at the time of the accident.

On the IES, K was in the Low subgroup with a Total IES score of 17. Her Intrusion score was 9 and her Avoidance score was 8. On the DASS, her Depression score (1)
was in the *Normal* range, Anxiety score (2) was in the *Normal* range, and Stress score (16) was in the *Mild* range.

On the CAFQ, *K* noted the following on the accident profile. She noted fearing for her life during the accident, that she is currently nervous before car travel, and that she tells the car driver what to do when in a car. On the avoidance items, *K* noted that she was, at times, avoiding driving on certain roads and often avoided cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by *K*’s significant other. It was noted that *K*, at times, appears nervous, on edge, irritable, or agitated before or during cycling; appears on edge, irritable, or agitated before or while driving; and avoids cycling near the accident scene. Her significant other noted that *K* often avoids cycling on busy roads. Her significant other added that since the accident that *K* has become more aggressive while cycling and rides more defensively.

The interview, at eight months post-accident, revealed a number of significant issues. *K* reported avoiding a number of situations following her accident. Of note, she reported that she competes in cycle sports and that her cycling coach aided her in rebuilding her cycling confidence following the accident. For example, he would ride with her when she trained. While she recounted not being under stress at the time of the accident, *K* reported that she was in another cycle accident three months after the one discussed. She did not receive any injuries in the more recent accident. *K* commented that she remembers being stuck to the car and being unable to unhook herself, she noted that this gave her a sense of being trapped. Lastly, she stated that she felt anger toward the driver for not stopping to check if she was okay and that his driving behaviour was illegal and, therefore, he should be accountable for it.

**Participant 12 (L):**

*L* is a 32-year-old female of New Zealand-European ethnicity. She collided with a car door when it was opened in front of her. When she hit the opened door, her head went through the door’s window breaking it. She sustained *minor* injuries, such as cuts on her arms and legs from the shattered glass.
On the IES, L was in the *Moderate* subgroup with a Total IES score of 21. Her Intrusion score was 10, placing her in the *Moderate* range and her Avoidance score was 11, placing her in the *Moderate* range. On the DASS, her Depression score (1) was in the *Normal* range, Anxiety score (2) was in the *Normal* range, and Stress score (7) was in the *Normal* range.

On the CAFQ, L noted the following on the accident profile. She reported that she is nervous before cycling and car travel, is easily distressed while cycling and while in the car, tells the driver what to do when in a car, and that she now cycles and drives less. On the avoidance items, L noted that she often avoided cycling, including cycling on certain roads. She noted always avoiding cycling in certain weather conditions.

On the QPIC, the following items were noteworthy as reported by L’s significant other. It was noted that L, at times, appears on edge, irritable, nervous, or agitated before or during driving; appears nervous before or during travel as a passenger, and, at times, avoids cycling. L’s significant other noted that she, at times, appears depressed since the accident. Further, L’s significant other recounted that L is more careful as a driver and cyclist since the accident and more aware of other road-users.

At 12 months post-accident, when interviewed, L reported avoidance that indicated that she was cycling phobic. She noted some cycling activity after the accident. However, she stated that shortly after her crash that she was cycling in the wet when her brakes failed. She interpreted this as an omen and, at the time of this incident, dumped her cycle in a rubbish skip. She added that she no longer will cycle in the wet or in the dark, and remarked that she no longer feels safe when cycling. She stated feeling anger toward cyclists and drivers following her accident.

She remarked that her social life has been affected as she no longer cycles to the activities she did in the past. She reported experiencing previous cycling and car accidents. She noted that in the past, she has suffered from anxiety, including panic attacks, and that she currently has similar symptoms. Interestingly, she remarked that
she would like to keep her anxiety levels up so that she will remain vigilant for road hazards.

**Participant 13 (M):**

*M* is a 34-year-old male of New Zealand-European ethnicity. He was cycling through an intersection, with the right of way, when a car failed to give way to him and, consequently, he hit the side of the car as it passed through the intersection. He rolled along the side of the car then landed on the road. The driver accelerated out of the intersection and pulled over. However, *M* noted that the driver was more concerned about getting her child to school rather than his condition. *M* noted being worried immediately after the accident, when lying on the road, that another car would strike him. He sustained *severe* injuries, such as dislocation of his left shoulder and a bruised right knee. Consequently, he missed seven weeks of work.

On the IES, *M* was in the *Low* subgroup with a Total IES score of 17. His Intrusion score was 5 (*Low* range) and his Avoidance score was 12, placing him in the *Moderate* range. On the DASS, his Depression score (4) was in the *Normal* range, Anxiety score (2) was in the *Normal* range, and Stress score (17) was in the *Mild* range.

On the CAFQ, *M* noted the following on the accident profile. He noted fearing for his life during the accident, that he is currently nervous before cycling, and that he is easily distressed while cycling. On the avoidance items, *M* noted that he was, at times, avoiding cycling in certain weather conditions and often avoided cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by *M*’s significant other. It was noted that *M*, at times, appears nervous before or during cycling and travel as a car passenger, and appears nervous when seeing other cyclists on the road, especially children. His significant other noted that *M* often appears irritable or agitated before or while driving. Her significant other added that since the accident that *M*, at times, shows more signs of being depressed, irritable, and angry.
When interviewed, at eight months post-accident, \( M \) reported avoiding a number of situations following his accident. Of note, he reported that he is still experiencing discomfort in his shoulder from the accident. Further, \( M \) reported that he was in another cycle accident three months after the one discussed. He did, at that time, receive injuries to his hand, which required stitching. He remarked that he now feels ‘road rage’ at times, reporting wanting to kick cars and being verbally abusive. He recounted recently verbally abusing a car driver in a supermarket car park. He noted that he has restricted his social life due to not wanting to use his cycle and because one of his friends lives in the accident area. He reported no stressors at the time of the accident; however, he noted that he has suffered from depression in the past.

**Participant 14 (N):**

\( N \) is a 68-year-old male of Australian-European ethnicity. He collided with a car door when it was opened in front of him. He sustained *minor* injuries, such as grazing to his hands and a sore left shoulder. Being retired meant no time was missed from work.

On the IES, \( N \) was in the *High* subgroup with a Total IES score of 65. His Intrusion score was 25, placing him the *High* range for this score. His Avoidance score was 40, placing him in the *High* range. On the DASS, his Depression score (8) was in the *Normal* range, Anxiety score (7) was in the *Normal* range, and Stress score (6) was in the *Normal* range.

On the CAFQ, \( N \) noted the following on the accident profile. He noted that he is nervous before cycling and car travel, and that he is easily distressed while cycling and while in the car. On the avoidance items, \( N \) noted that he always avoids cycling in certain weather conditions, avoids hearing news about accidents, and avoids seeing wounds or injuries.

On the QPIC, the following items were noteworthy as reported by \( N \)’s significant other. It was noted that \( N \), at times, avoids cycling. Further, it was reported that \( N \) often appears on edge, irritable, or agitated before or while cycling; often avoids cycling near the accident site; often is nervous when seeing other cyclists on the road; and often avoids talking about the accident, and often appears distressed when
discussing it. His significant other noted that N always appears nervous before or during cycling or travelling in a car; always avoids cycling on busy roads; and always avoids cycling near the accident scene. Further, N’s significant other reported that he, often, since the accident, appears depressed, anxious or nervous, and more angry and irritable. N’s significant other noted that cycling has now become a source of worry for N.

The interview, at five months post-accident, revealed a number of concerns. N reported still having some shoulder discomfort resultant from the accident, and avoiding cycling in a number of situations. He recounted being under stress at the time of the accident and currently. He noted that he is "sick of life" and that his arthritis is causing him a lot of pain. N noted he also has a forthcoming hip replacement operation. Despite no significant scores on the DASS, N exhibited signs of possible current depression, such as expressing a loss of enjoyment in life. Further, he questioned the value of life, "why bother being alive?"

Participant 15 (O):
O is a 54-year-old male of New Zealand-European ethnicity. He was turning at a signed intersection, with the right of way, when a car failed to give way to him. This led to him striking the car’s bonnet and rebounding onto the road. He sustained moderate injuries, such as deep bruising to his right leg, right ankle, and to his ribs. Subsequently, he missed one day of work.

On the IES, O was in the Moderate subgroup with a Total IES score of 27. His Intrusion score was 20, placing him the High range for this score. His Avoidance score was 7, placing him in the Low range. On the DASS, his Depression score (9) was in the Normal range, Anxiety score (6) was in the Normal range, and Stress score (16) was in the Mild range.

On the CAFQ, O noted the following on the accident profile. He noted that he is easily distressed while cycling, he tells the driver what to do when in a car, and he cycles less than he used to. On the avoidance items, O noted that he often avoids
driving on certain roads, avoids cycling in certain weather conditions, avoids hearing news of accidents, and avoids seeing injuries or wounds.

On the QPIC, the following items were noteworthy as reported by O's significant other. It was noted that O, at times, avoids cycling on busy roads and appears nervous when seeing other cyclists on the road. His significant other noted that O often avoids cycling near the accident scene.

Interviewed, at two months post-accident, O reported still having some discomfort in his ribs, and reported avoiding cycling at the accident area. Further, he reported high levels of anxiety in most cycling situations, especially if he knew or could hear a car approaching him from behind. He recounted being under stress at the time of the accident. He noted that he had just returned to work after injuring his hand that resulted in losing a finger. He reported finding it difficult to relearn to use his hand and coping with the pain he felt in his hand. Concerning past psychological difficulties, O noted a history of anxiety. Since the accident, he remarked that he feels he may be overly sensitive to possible hazards when on his cycle and that he is hypervigilant of car movements. He added that he sometimes argues with himself if he could have done something different to prevent the accident.

Participant 16 (P):

P is a 24-year-old female of New Zealand-European ethnicity. She was cycling when a car, travelling from the opposite direction, did a u-turn and cut in front of her, and she collided with the front of the car. P stated that the car was full of young guys who verbally abused her and threatened her after the accident. Further, they grabbed her companion and tried to punch him. She reported going into a hotel to avoid further confrontation. She sustained moderate injuries, such as a hairline fracture to her elbow, and grazing to both of her hands. This led to missing four day's work.

On the IES, P was in the Moderate subgroup with a Total IES score of 29. Her Intrusion score was 19, placing her in the Moderate range. Her Avoidance score was 10, placing her in the Moderate range. On the DASS, her Depression score (2) was in
the Normal range, Anxiety score (11) was in the Moderate range, and Stress score (11) was in the Normal range.

On the CAFQ, P noted the following on the accident profile. She noted having nightmares about the accident; that she is currently nervous before cycling; that she is easily distressed while cycling and during car travel; and that she tells the driver what to do. On the avoidance items, P reported that she was, at times, avoiding cycling. Further, she noted often avoiding cycling on certain roads and cycling in certain weather conditions.

On the QPIC, the following items were noteworthy as reported by P’s significant other. P, at times, appears on edge, irritable, or agitated before or during cycling. Further, at times, P avoids talking about the accident and appears upset or distressed when discussing it. Further, her significant other noted that P often appears nervous before or during cycling; often avoids cycling; and always avoids cycling on busy roads. Lastly, P’s significant other stated that, since the accident, P has appeared more nervous or anxious than normal.

When interviewed, at nine months post-accident, P reported still having some elbow discomfort resultant from the accident, and reported avoiding a number of situations following her accident. Of note, she reported that she would walk rather than cycle anywhere. Further, she remarked that her social life has been affected as most of her friends participate in activities that include cycling. She noted she has lost all of her confidence and is continually scared about road use.

She noted that at the time of the accident that she was having some difficulties at work and finding somewhere to live. She commented that the accident compounded things and that at her life at that time was a “big mess”. She noted that she regretted not calling the police after the accident, especially in light of the vehicle occupants’ verbal abuse and behaviour. She viewed this as victimisation and has concerns about how things may have turned out if her companion had not been there. She recalled feeling extremely embarrassed and humiliated (“felt stupid”) at the time of the accident. She attributed this to it being peak traffic time and that they had halted
traffic by colliding in the middle of the road, further everyone was looking at her. She expressed that it all seemed “odd” at the time, a feeling of “what is happening?” Her accident and its resultant psychological distress are consistent with her Moderate anxiety levels on the DASS.

**Participant 17 (Q):**

*Q* is a 21-year-old male of New Zealand-European ethnicity. He collided with a car door when it was opened in front of him, which led to him being thrown forward into the air. He sustained *moderate* injuries, such as deep cuts to his hands, grazing to his shoulders and back, and general bruising.

On the IES, *Q* was in the Low subgroup with a Total IES score of 13, with an Intrusion score of 8 and an Avoidance score of 5. On the DASS, his Depression score (1) was in the Normal range, Anxiety score (2) was in the Normal range, and Stress score (1) was in the Normal range.

On the CAFQ, *Q* reported nothing of significance. On the QPIC, the following items were noteworthy as reported by *Q*’s significant other. It was noted that *Q*, at times, avoids cycling on busy roads. No further items were noted to be of concern. Moreover, *Q*’s significant other reported that *Q* recovered from his accident very quickly and that she doubted it had a significant psychological effect on him and that he is still keen to use his cycle. The interview, at nine months post-accident, revealed no issues of distress. The only point noted was that he now has an increased awareness of parked cars and their potential opening doors.

**Participant 18 (R):**

*R* is a 43-year-old female of New Zealand-European ethnicity. She was cycling past a car that was double parked when it swung out to do a u-turn. Consequently, the car cut her off and she struck it. She sustained *minor* injuries, such as a sprained ankle, grazing to her left leg, and a muscle spasm in her stomach that resulted in a small surface lump. This led to missing three day’s work.

On the IES, *R* was in the Low subgroup with a Total IES score of 7. Her Intrusion score was 6 and her Avoidance score was 1. On the DASS, her Depression score (6)
was in the Normal range, Anxiety score (0) was in the Normal range, and Stress score (8) was in the Normal range.

On the CAFQ, R noted the following on the accident profile. She noted that she is currently nervous before cycling and that she tells the driver what to do when in a car. On the avoidance items, R noted that she was, at times, avoiding cycling.

On the QPIC, the following items were noteworthy as reported by R's significant other. It was noted that R, at times, appears nervous before or during travel as a passenger. Further, her significant other noted that R, at times, appears upset or distressed when discussing the accident.

At the interview, at two months post-accident, R reported still having some ankle discomfort resultant from the accident. R reported avoiding a number of situations following her accident. Of note, she reported that she was avoidant of and nervous about cycling and reported “jumpiness” (when in a car) in the three weeks after her accident. She remarked that she was concerned, when driving or in a car, that someone was going to pull out in front of her. She stated that she would see cars coming up to a stop sign and believed they would not stop but go through. She noted some stress at the time of the accident. This stress was associated with a recent relationship break up, a heavy workload, and concerns about her son returning to boarding school, which he was unhappy about. She remarked that because the driver of the car in the accident was genuinely sorry, was also distressed during the crash, and paid expenses related to the accident, that it made it easier to get through the experience.

**Participant 19 (S):**
S is an 18-year-old female of New Zealand-European ethnicity. She was cycling when an occupant of a car opened their door in her pathway. Consequently, she struck the door and rebounded onto the road. She sustained very minor injuries, such as scratches to her body.
On the IES, S was in the Low subgroup with a Total IES score of 5. Her Intrusion score was 2 and her Avoidance score was 3. On the DASS, her Depression score (3) was in the Normal range, Anxiety score (7) was in the Normal range, and Stress score (8) was in the Normal range.

On the CAFQ, S noted the following on the accident profile. She noted that she is currently nervous before cycling and car travel, and that she is easily distressed while cycling. She added that she also tells the driver what to do when in a car. On the avoidance items, S noted that she was, at times, avoiding cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by S’s significant other. It was noted that S often appears nervous, on edge, irritable, or agitated before or during cycling; and often avoids cycling on busy roads. Her significant other added that since the accident, that S is more nervous while cycling and that S now views herself as a “bad” cyclist.

At two months post-accident, when interviewed, S recounted a few points of concern. Of note, she reported that she is anxious when cycling around the time of day that her accident happened. She also reported having a collision with another cyclist two days before the accident discussed above. S commented that it made a big difference to her reaction to the accident, that the driver of the car was sincere and apologetic.

Participant 20 (T):
T is a 43-year-old male of New Zealand-European ethnicity. He was cycling around a roundabout, when a car failed to give way to him. He was struck by the car, which led to him being thrown two metres forward. Following this, the car ran over his foot. He sustained moderate injuries, such as a seriously bruised foot and grazing to his right leg and arm. Subsequently, he missed a week of work.

On the IES, T was in the Low subgroup with a Total IES score of 2. His Intrusion score was 2 and his Avoidance score was 0. On the DASS, his Depression score (0) was in the Normal range, Anxiety score (0) was in the Normal range, and Stress score (0) was in the Normal range.
On the CAFQ, T reported nothing of significance. On the QPIC, the following items were noteworthy as reported by T's significant other. It was noted that T often appears upset or distressed when discussing the accident. No further items were noted to be of concern.

The interview, at two months post-accident, revealed no issues of distress. He noted no stress at the time of the accident; however, he reported a past depressive episode. Of note, T reported that he believed that his heavy utilisation of cycling over the past 20 years might have made him more resilient to consequences of the accident. He stated he is philosophical about the crash and sees it as "one of those things that happens". He added that he sees the positive aspect of the accident, such as getting a new cycle from the driver. He did report that he does vividly recall the look of surprise on the driver's face, a young girl, when the accident occurred. He added that at the time of the accident he felt upset for her, as she was so distressed.

Participant 21 (U):

U is a 44-year-old female of New Zealand-European ethnicity. She was cycling around a roundabout when an overtaking car swerved toward her causing her to hit the curb. The cyclist continued to cycle after giving the car's driver the two finger sign (i.e., an obscene gesture). The car then stopped in front of her and the driver opened their door and yelled abuse as she cycled around the vehicle. Following this, the cyclist reported that the driver followed her, trying to hit her, which eventually occurred. The driver struck the cyclist's shoulder with the car's side mirror. The cyclist then got off her cycle and walked along the footpath, she noted being terrified. She stated that the car then drove slowly on the roadside beside her. At this time, the cyclist walked into a park and the driver drove off. She sustained moderate injuries, such as a ripped neck muscle and a sore right shoulder. She added that in the past she has had neck pain and that the bang to her shoulder exacerbated this condition. Consequently, she took two days off work.

On the IES, U was in the Low subgroup with a Total IES score of 13. Her Intrusion score was 2, placing her in the Low range. Her Avoidance score was 11, placing her in the Moderate range. On the DASS, her Depression score (8) was in the Normal
range, Anxiety score (0) was in the Normal range, and Stress score (11) was in the Normal range.

On the CAFQ, U noted the following on the accident profile. She reported that she feared for her life during the accident experience and that she is easily distressed while cycling. On the avoidance items, U noted that she was, at times, avoiding cycling in certain weather conditions.

On the QPIC, the following items were noteworthy as reported by U’s significant other. It was noted that U, at times, appears nervous, on edge, irritable, or agitated before or while cycling. It was noted that U avoids cycling at times. Further, U’s significant other recounted that she often appears upset or distressed when discussing the accident. It was further reported that, at times, since the accident, that U has shown signs of being down or depressed and being more irritable or angry than normal. U’s significant other added that U had a considerable confidence loss following the accident, but has now (10 months later) almost returned to her normal self. Further, it was noted that U felt vulnerable after the accident and saw every car as a threat. This was most profound on parts of roadway where there were only a few cars present.

At the interview, at 10 months post-accident, U reported some neck discomfort. She noted using her car more often and avoiding cycling, as she was terrified. She reported that when she first cycled, six weeks post-accident, that she was very vigilant and she kept a pen and paper on her to record any “bad” drivers’ licence plates. She reported that she often looks in cars to see if she can recognise the driver of the car involved in the accident. She reported being paranoid when cycling, especially in situations when there were fewer cars around (i.e., she felt unsafe with fewer people around- “safety in numbers”). U remarked that the accident led to her losing her confidence in a number of areas. She added that she had difficulty understanding why someone wanted to hurt her.

She recalled being under some stress at the time of the accident that was related to work pressure, both her daughters sitting academic examinations, and her husband
having to go into hospital the week after the accident. She reported that she has been treated for chronic pain in the past and that she has ongoing health difficulties. Lastly, U recounted that she still fears the driver involved in the accident. She commented that since she could not identify them that she is continually vigilant and wary of any vehicle that resembles the one in the incident.

**Participant 22 (V):**

V is a 39-year-old male of New Zealand-European ethnicity. He was cycling around a roundabout when a car failed to give way to him. The car struck him side on and, subsequently, he was thrown onto the car’s bonnet and he indented the car’s screen and he was finally thrown two metres forward. He sustained very minor injuries, such as bruising to his left leg. No time was missed from work.

On the IES, V was in the Low subgroup with a Total IES score of 2. His Intrusion score was 2 and his Avoidance score was 0. On the DASS, his Depression score (16) was in the Moderate range, Anxiety score (1) was in the Normal range, and Stress score (14) was in the Normal range.

On the CAFQ, V noted the following on the accident profile. He noted fearing for his life during the accident and that he now cycles less than he used. On the avoidance items, V noted that he was, at times, avoiding cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by V’s significant other. It was noted that V, at times, is nervous before or while travelling as a passenger and avoids cycling on busy roads. His significant other noted that V, at times, since the accident, has difficulty sleeping and is more than normally irritable or angry. Further, it was noted that V, at times since the accident, shows signs of being down or depressed. This is consistent with his elevated depression levels on the DASS.

The interview, at 11 months post-accident, documented a number of issues. V reported that while he is not necessarily avoidant since the accident, that his anxiety level when cycling has gone up significantly, especially on busy roads. He added that he now has heightened concern about his young children cycling. V reported not being under
stress at the time of the accident. He reported being angry at the time of the accident, however, he remarked that the driver, an elderly woman, was remorseful and accepted responsibility for the accident. \( V \) empathised with her, and he remarked, “we all make mistakes”.

**Participant 23 (W):**

\( W \) is a 36-year-old male of New Zealand-European ethnicity. He was approaching an intersection, with the right of way, when a car coming into the intersection failed to give way. The cyclist braked to avoid the car (a four wheel drive) but believes he slid under the front of it. He recollected a massive banging noise as the accident occurred and fearing that his neck would break. He sustained severe injuries, such as cuts to his arms and legs requiring stitches. In addition, his face was seriously cut, requiring 40 stitches to his forehead, chin, and nose. He needed six hours surgery to his nose. Consequently, he missed nine days of work.

On the IES, \( W \) was in the Low subgroup with a Total IES score of 13. His Intrusion score was 5 and his Avoidance score was 8. On the DASS, his Depression score (1) was in the Normal range, Anxiety score (0) was in the Normal range, and Stress score (4) was in the Normal range.

On the CAFQ, \( W \) noted fearing for his life during the accident; that he is nervous before cycling; that he tells the driver what to do; and cycles less than he used to. On the avoidance items, \( W \) noted that he was, at times, avoiding cycling.

On the QPIC, the following items were noteworthy as reported by \( W \)’s significant other. \( W \), at times, is nervous before or while travelling as a passenger. Further, \( W \)’s significant other reported that \( W \) has been distressed by the scarring to his face from the accident and it is taking time for him to come to terms with it. In addition, \( W \)’s significant other remarked that while the driver showed concern at the time of the accident, they have failed to contact \( W \) since to check on his condition.

Three months post-accident, at the interview, \( W \) reported still having some discomfort resultant from the accident, such as numbness in his nose, his leg wounds being infected at times, and stiffness to his shoulder that was knocked in the accident. \( W \)
reported not cycling since the accident; he viewed this as a combination of not normally cycling at this time of the year and weariness about cycling. He recounted being under stress at the time of the accident. This included his wife being eight months pregnant and W not wanting the accident to distress her.

W reported that he declined to press charges against the driver at the time of the accident. However, he is now contemplating this due to the driver’s lack of communication. That is, the police reported that the driver was going to telephone W, which has not occurred. W commented that he questions why the driver has not called or offered to compensate for the damage done to his cycle. W reported that when he now drives past the intersection that he is worried that a car might pull out in front of him. He added that in the week following the accident, he kept reliving it and considering what he might have done to prevent it.

Participant 24 (X):
X is a 46-year-old male of New Zealand-European ethnicity. He was cycling to work in the morning when a car was blocking his right of way. He tapped on the car’s window and shook his head at the driver because he had to cycle off the road seal to go around the car. Following this, X reported that the car came up behind him, followed him onto the grass verge and banged his cycle. The cyclist was thrown over his handlebars onto the grass.

At this point, X picked up his cycle to show the damage incurred to the driver. The driver got out of his car and, according to X, stared angrily at him. X reported that he was very scared and felt the driver was going to harm him. He repeatedly told the driver he was not injured and to go away. The cyclist noted no one in the traffic came to his aid at this point. He noted he felt cornered and extremely threatened. X then began kicking the car’s door and told the driver to “fuck off”. The driver then proceeded to leave. Following this, X sat down and cried, noting it as an emotional reaction to the experience. Eventually, a truck driver stopped and assisted him. He sustained very minor injuries, such as grazing and aggravation to an existing shoulder injury.
On the IES, X was in the High subgroup with a Total IES score of 33. His Intrusion score was 24, placing him the High range for this score. His Avoidance score was 9, placing him in the Low range. On the DASS, his Depression score (3) was in the Normal range, Anxiety score (5) was in the Normal range, and Stress score (11) was in the Normal range.

On the CAFQ, X noted the following on the accident profile. He noted fearing for his life during the accident; that he is easily distressed while cycling; and that he cycles less than he used to. On the avoidance items, X noted that he was, at times, avoiding cycling and was avoiding driving on certain roads. He reported that he often avoids cycling on certain roads.

On the QPIC, the following items were noteworthy as reported by X's significant other. It was noted that X, at times, avoids cycling, avoids cycling near the accident scene, appears nervous when seeing other cyclists on the road, and often avoids cycling on busy roads. It was noted that X, at times, appears distressed or upset when discussing the accident. Further, X's significant other reported that X, at times, since the accident, has difficulty sleeping, is more than normally anxious or nervous, and appears down or depressed.

The interview, at 12 months post-accident, noted a number of noteworthy issues. X reported avoiding cycling and being anxious when cycling. Of note, he reported that rather than cycling to a local, recreational forestry track, he will now put his cycle in the car and take it to the forest and then only cycle on it there. He added that when he does cycle he will get off his cycle at busy intersections and walk with it, and that he will leave home later for work to avoid traffic. Further, X stated being anxious about his 10-year-old son cycling to school. He noted that he often questions his son about the route he takes and, at times, he would cycle with him and make him get off his cycle and walk at intersections. He commented he wanted to stop his son from cycling altogether.

He recounted being under stress at the time of the accident, such as work difficulties, and he reported a recent depressive episode. X noted a number of previous cycling accidents also that included minor injuries. Further, he added he has been charged
with wilful damage to the driver’s car and that he intends to appeal this charge. He further noted that the driver was charged with careless use of a motor vehicle. Overall, the cyclist noted resentment toward the driver and a sense that he was not heard by the police.

**Participant 25 (Y):**

Y is a 65-year-old male of European ethnicity. He was cycling when a car hit him from behind. Following this he was thrown into the air and received a bang to his head when he landed on the road. He did not lose consciousness though. The cyclist noted he had no indication of the car coming from behind him, that is, he did not see or hear it approaching. He sustained *very minor* injuries, such as grazing to his left leg.

On the IES, Y was in the *Low* subgroup with a Total IES score of 0. His Intrusion score was 0 and his Avoidance score was 0. On the DASS, his Depression score (0) was in the *Normal* range, Anxiety score (0) was in the *Normal* range, and Stress score (1) was in the *Normal* range.

On the CAFQ, Y reported nothing of significance. On the QPIC, Y’s significant other reported nothing of significance. The interview, at two months post-accident, revealed no issues of distress. He noted he is a bit more alert when cycling, but otherwise reported no avoidance or anxiety in association to road use. He reported no stress at the time of the accident or past psychological difficulties. Y commented that he is a “down to earth” person, and things happen (i.e., the accident) and he should just move on. He attributes his positive attitude to the fact that he had a diseased lung removed five years ago and he has never looked back since then, remarking “I am one of the few lucky ones, given a second chance at life…. make the most it, living life to the full, enjoy it while you can”. He added, “got hit by a car, was okay so why worry…could’ve been worse”.

**Participant 26 (Z):**

Z is an 18-year-old female of New Zealand-European ethnicity. She was cycling in a forward direction when a vehicle hit her as it was turning from the opposite direction
into a side street. Z was knocked to the ground; she then jumped up quickly and began cursing. She added that she went into shock and was shaking and crying. She sustained very minor injuries, such as a grazed hand and a tender tailbone.

On the IES, Z was in the High subgroup with a Total IES score of 43. Her Intrusion score was 17, placing her in the Moderate range. Her Avoidance score was 26, placing her in the High range. On the DASS, her Depression score (17) was in the Moderate range, Anxiety score (15) was in the Severe range, and Stress score (24) was in the Moderate range.

On the CAFQ, Z noted the following on the accident profile. She noted that she is currently nervous before cycling, that she is easily distressed while cycling, and that she tells the driver what to do. On the avoidance items, Z noted that she was, at times, avoiding cycling and avoiding seeing wounds or injuries. Further, she reported often avoiding cycling on certain roads, avoiding cycling in certain weather conditions, and avoiding crossing streets alone.

On the QPIC, the following items were noteworthy as reported by Z’s significant other. It was noted that Z, at times, appears nervous, on edge, irritable, or agitated before or during cycling and avoids cycling on busy roads. Further, her significant other noted that Z, at times, has had difficulty sleeping since the accident.

When interviewed, at two months post-accident, Z reported still having some tailbone discomfort. She reported avoiding a number of situations following her accident. Of note, she reported that she “hates traffic, gets nervous and tense”. Further, she stated that when there is a lot of traffic around that she sweats more than usual. She added that when she does cycle she tries to take quieter streets and if the road is busy she will get off her cycle and walk or will cycle on the footpath. Z noted stress at the time of the accident including quitting her job and looking for work, moving house, and sibling conflict. Reflecting on the accident, Z remarked that she was angry that the driver did not stop immediately but further down the road. She further reported being angry that the driver had not called since the accident to check if she was okay. Z’s recent stressors and the accident’s impact correspond with her elevated DASS scores.
Participant 27 (AA):

AA is a 61-year-old male of New Zealand-European ethnicity. He was cycling downhill when a car overtook him and clipped his cycle sending him into the air. The cyclist reported that he was “cart wheeling” through the air before hitting the road, at which time he feared being run over by another vehicle. He noted being bewildered as to why the vehicle involved did not stop. He sustained moderate injuries, such as a cut to his chin and a laceration to his elbow both requiring stitches, as well as the skin being ripped from his knees. He reported missing four days of work.

On the IES, AA was in the Moderate subgroup with a Total IES score of 26. His Intrusion score was 17, placing him the Moderate range for this score. His Avoidance score was 9, placing him in the Low range. On the DASS, his Depression score (2) was in the Normal range, Anxiety score (2) was in the Normal range, and Stress score (10) was in the Normal range.

On the CAFQ, AA noted the following on the accident profile. He noted fearing for his life during the accident; that he is nervous before cycling; that he is easily distressed while cycling and while in the car; and that he tells the driver what to do. On the avoidance items, AA noted that he was at times avoiding cycling on certain roads and avoiding cycling in certain weather conditions. On the QPIC, the following items were noteworthy as reported by AA’s significant other. AA, at times, appears on edge, irritable, agitated, or nervous before or while cycling; avoids cycling on busy roads; and often appears upset or distressed when discussing the accident.

The interview, at two months post-accident, noted a number of issues. AA reported still having some discomfort in one of his knees as it was taking a long time to heal. He reported avoiding cycling in a number of situations, and he noted that he no longer wears ankle clips (to hold in pants/trousers) around the bottom of his legs so that if he needs to get off his cycle quickly he can. AA remarked that he is now more aware of the “closeness” of cars. Of significance, he added that he is concerned about finding the “black, Ford Falcon” involved in the accident. He noted being frustrated with the police in their attempt to find the driver. He believes the driver’s impatience to get past him triggered the accident.
2.6 DISCUSSION

The purpose of the current study was to investigate the occurrence of psychological distress in adult cyclists following a cycling accident that involved a motor vehicle. This is of particular importance to the population of Christchurch given their heavy utilisation of cycles. Indeed, the population of Christchurch has a higher cycle use than the New Zealand national average, i.e., cyclists in Christchurch cycle more often and further than cyclists in any other region (LTSA, 2000b; Munster, Koorey, & Walton, 2001). Further, cycling is an extensively promoted activity in Christchurch and is an established leisure interest and means of transport. The Christchurch City Council (CCC) noted that Christchurch’s cycle strategy is “to be the most cycle-friendly city” (CCC, 2000, p. 6). They added that “cycle-friendly city” is interpreted as “Where the environment, social and health benefits of cycling are recognised and facilities are provided to ensure cycling is a safe, enjoyable and popular form of transport” (CCC, p. 6). They noted that Christchurch’s natural appropriateness for cycling, “The city’s size, climate and topography is conducive to cycling for transport and recreation” (CCC, 2000, p. 6). Thus, the findings of this research are especially relevant to the cyclists of Christchurch, as well as, cycle users elsewhere.

Taylor and Deane (2000) remarked that while PTSD-focused research has contributed to our knowledge of the sequelae of road accidents, this focus may have unintentionally led to a disregard for the wider driving-fearful population. This research has attempted to address a smaller, related subgroup of road-users who may be fearful following a cycling accident. That is, given that it appears that cyclists have not been exclusively studied as road accident survivors, from a psychological perspective, this research endeavoured to draw attention to this group. While the sample size was not large, the results confirm the occurrence of evident psychological distress in cyclists following a road accident. The outcome reported, namely that around one-third of the cyclists in this study expressed psychological distress, is similar to other research on other types of road accident victims. Moreover, around one-fifth were noted to have significant levels of post-traumatic stress.

Prior to discussing the significance of these findings, there are methodological limitations that need to be addressed. At the outset, it needs to be noted that while this
study has limitations, such as no control sample, its intent was to be exploratory. Indeed, given that no previous research has focused solely on cyclists, one could argue that such an initial study is required before others of its kind are carried out.

While the lack of a control group places limitations on this research, it should be recognised that a number of comparison groups were employed so as to evaluate the current research’s findings against international results. Firstly, IES scores for the road accident victims in this sample were compared (see Table 9) with Australian road accident research by Bryant and Harvey (1996). The results of this comparison will be reviewed later in this section but it needs to be noted that the use of Bryant and Harvey’s (1996) IES scores provides a similar population in terms of trauma and cultural origin. Secondly, the IES results for individuals in the current study were compared with IES findings in eight international studies on road accident survivors (see Table 10). These comparisons give an indication of how the cyclists’ IES scores equate to other road accident victims and provide details of Intrusion and Avoidance scores. Lastly, the use of Briere and Elliott’s (1998) IES findings in trauma (incorporating a wide range of traumas including MVAs) and non-trauma samples allows the comparison of the cyclists’ levels of distress as measured by the IES with two distinct samples (see Table 11). The details of this comparison will follow below. Overall, the use of the above sample populations and their IES scores enables the current research to be related to other post-trauma research, particularly MVA-induced distress. Comparisons with overseas research were an essential part of this study; however, in the future it would be desirable for trauma research in New Zealand road accident survivors to employ appropriate local control groups.

Of note, participants were recruited by advertising as recruiting via hospital records is both difficult and time consuming in New Zealand. Thus, it cannot be determined if this sample is fully representative of all cycling accident victims. Certainly, the participants who self-selected for this research may have had their own motivations for doing so. As Ho et al. (2000) noted in regard to their MVA sample, participants’ reasons might include personal grudges (in this case perhaps against car drivers in general), frustrations, anger, or unresolved disputes with the other parties involved in the road accident. Further, it may be that some of the participants were help or treatment-seeking so that the sample may have over represented those with
psychopathology. It is therefore possible that the sample may have not been a valid representation of the number of cyclists with and without psychopathology following a road accident. These underlying issues may have influenced the way that participants responded to questionnaires and interview questions as well as determining those who came forward. However, it should be noted that Koenen, Goodwin, Struening, Hellman, and Guardino (2003) reported that previous research into treatment seeking behaviour for those individuals with PTSD has been minimal and that many sufferers go undetected or unrecognised. Therefore, future research needs to focus on sample characteristics, particularly self-selection within post-trauma road accident research.

In addition, since participants were interviewed between 2 and 12 months following their accident, with a mean of 5.8 months, there is the possibility that a recall bias could have influenced their responses. Furthermore, the results may have been affected by cycling accident survivors' reluctance to participate in this research. That is, as noted in the literature review earlier, there is a tendency for those with post-traumatic avoidance symptoms to avoid psychological research as it entails confronting the very issues they wish to evade. Therefore, it could be argued that this sample may in fact under represent the prevalence of adverse psychological distress following a cycling accident, due to an aversion to participate.

The small size of the sample (27) may have impacted on the validity and reliability of the current research. However, given that the study received good media coverage and participant recruitment was labour intensive (including widespread advertising), it appears that only a recruitment period of years would overcome the small sample size issue. Moreover, the 27 cyclists who took part in this research are a reasonable proportion of the 86 cyclists who had been recorded officially as having had cycling accidents involving a motor vehicle, in Christchurch, in the previous year. The results of this research need to be interpreted with caution but this should not detract from the importance of the findings nor the qualitative conclusions. Future research in this area will need to employ a larger sample size and attract participants of non-Caucasian ethnicity, particularly Maori.
Twenty-seven cyclists, aged between 18 and 68 years, from the Christchurch municipal area participated in this study. All had been involved in a cycling accident with a motor vehicle in the past 12 months. There were a number of accident scenarios represented, including collisions at intersections, roundabouts, and with opened car doors. Injury severity ranged from little or none (e.g., superficial grazing) through to severe (e.g., broken ribs, deep facial cuts).

The Impact of Event Scale (IES) was used to determine participants’ current subjective distress and its use in this study was based its previous use by Bryant and Harvey (1996), which this study partly replicated. Further, given that the IES assesses subjective distress, rather than focusing specifically on PTSD, the use of the IES was determined appropriate and in line with the exploratory nature of the present research. Shipherd et al. (2000) reported that the IES is one of the most extensively employed PTSD measures and it assesses the frequency of subjective distress as determined by intrusive and avoidance symptoms. Stallard, Velleman, and Baldwin (1999) noted, “This scale [IES] has been widely used with adults to assess the degree of subjective distress arising from a specific trauma” (p. 1076). At the time of this research the Impact of Event Scale – Revised (Weiss & Marmar, 1997) was available; however, it required further empirical evaluation (Orsillo, 2001) and therefore its use was not deemed appropriate.

According to the scoring interpretation provided by Bryant and Harvey (1996), it was found that approximately one-fifth (22%, n = 6) were in the high range for distress, 15% (n = 4) were in the moderate range, and the remaining 63% (n = 17) were in the low range. Overall, IES scores indicated that around one-third (37%, n = 10) of the cyclists in this study were experiencing moderate to high levels of post-accident psychological distress. Bryant and Harvey (1995a) noted, based on McFarlane’s (1988) research, that an IES score of ≥ 30 indicated significant post-traumatic stress. Therefore, 22% of the cyclists in this study presented with significant post-traumatic stress symptoms.

In particular, 19% (n = 5) and 22% (n = 6) expressed high and moderate intrusive symptoms, respectively. Further, 11% (n = 3) and 22% (n = 6) expressed high and
moderate avoidance symptoms, respectively. Of note, by recording any participant who was in the high range on the total IES score or, failing that, high on either of the subscales (i.e., intrusion or avoidance), it was found that approximately one-quarter (26%, n = 7) of the sample were experiencing high levels of psychological distress. This finding signifies that at least one-quarter of cycling accident victims involved in a road accident with a motor vehicle may experience high levels of psychological distress in the year post-accident.

On the whole, it was found that Bryant and Harvey’s MVA sample exhibited higher IES scores, following a road accident, than the current study. However, it needs to be noted that their study administered the IES between 1 and 15 days post-accident, whereas, the current study administered the IES between 2 and 12 months post-accident, with a mean of 5.8 months. Thus, it could be argued that the lower scores in this study are due to time elapsed rather than less distress in cyclists. Certainly, the current study’s IES means for total, intrusion, and avoidance scores are not dissimilar from other MVA samples (refer to Table 10).

Indeed, in regard to the means (total, intrusion, & avoidance) of this study in comparison to Briere and Elliott’s (1998) U.S. samples of varying or no trauma, the following was noted. Firstly, there were significant differences found between this study’s means and Briere and Elliott’s ‘No Trauma History’ means. This was expected as it indicated that the means of the cyclists who had experienced an accident were significantly higher than the means derived from Briere and Elliott’s U.S. general population group with no trauma history. This suggested that the cyclists were expressing higher distress than those in the general community. Secondly, the means of the current study did not differ significantly from Briere and Elliott’s “Trauma History” sample. That is, the distress found in the cyclists was comparable to that of individuals who had experienced various traumas in the past (e.g., violence, sexual abuse, MVAs). Thus, this suggested that the participants in this study were experiencing levels of psychological distress that corresponded with levels of distress found in other survivors of traumatic events.

With regard to PTSD, the IES scores in this study demonstrated the following. As noted earlier, 22% were found to experience significant post-traumatic stress.
According to Bryant and Harvey (1996), those in this high IES range (≥ 30) are experiencing the core symptoms indicative of PTSD. As noted earlier, Blanchard and Hickling (1997) advocated caution against using the IES as an exclusive diagnostic tool for PTSD. They noted that 28% of their MVA group who had IES scores > 30 on the IES did not meet PTSD criteria (10% were non-PTSD, the balance were subsyndromal). Therefore, a conservative adjustment, by decreasing the scores of those in the current sample with scores over 30 by 28%, found that 16% may be suffering from PTSD. Further, Blanchard and Hickling (1997) noted that they had a false negative rate of 12% (i.e., 12% with scores below 20 actually had PTSD).

On the other hand, Selly et al. (1997, p. 479) reported that a higher cut-off IES score of ≥ 40 is a “strong indicator of a diagnosis of PTSD” (note, according to DSM-III-R criteria). Thus, in respect to this sample, four participants (participants: 9, 10, 14, & 26) scored ≥ 40. This suggests that 15% of the cyclists in this study were experiencing PTSD. Consequently, the best estimate, based on other researchers’ experiences with the IES and PTSD, for PTSD in the current cycling sample would be between 15% and 22%. That is, this study argues that between 15% and 22% of cycling accident victims are likely to suffer from PTSD and at least 37% of cyclists are vulnerable to considerable levels of psychological distress following a road accident.

Therefore, considering the most recent cyclist injury rates for New Zealand the following is estimated in regard to psychological distress. In 1999, 619 cyclists were reported injured on New Zealand roads (LTSA, 2002). Thus, it could be suggested that up to 229 could develop considerable levels of psychological distress and, of this number, between 93 and 136 could develop PTSD. In regard to Christchurch, 86 cyclists were in reported accidents (LTSA, 2002). Therefore, it could be suggested that up to 32 with considerable levels of psychological distress and, of this number, between 13 and 19 could develop PTSD. It should be noted that these rates are likely to be conservative given that these figures represent reported accidents only and do not reflect the number of people whose accidents were not officially recognised.
Conlon, Fahy, and Conroy (1999) reported that high initial distress (indicated by IES subscale scores ≥ 12, 3–14 days post-accident), increasing age, and high levels of perceived threat, in a group of minor injured, MVA survivors were predictors of psychological morbidity. Further, Craig et al. (1996) found, based on a road accident sample, that intrusions (measured by the IES) correlated with symptom distress in the year following the participants’ road accidents. They noted that those accident victims who reported more intrusive thoughts also reported more symptom distress. They noted that these findings support the association between intrusions and long-term reactions to those involved in a road accident.

Conlon et al. (1999) suggested that despite the IES’s low specificity, that early administration of this tool may be clinically useful and might be an alternative for clinical assessment in busy accident and emergency departments. Feinstein and Dolan (1991), based on their sample of trauma-related physically injured participants (e.g., motor-cycle and motor accidents), reported that scores on the IES, within seven days post-trauma, were the single most valuable predictor of psychiatric illness in general and in particular PTSD, at both six weeks and six months post-accident. Further, Briere and Elliott (1998) reported that the conciseness of the IES may support its use in screening conditions where time restrictions might make more time-consuming measures, such as the Trauma Symptom Inventory (Briere, 1995, cited in Briere & Elliott, 1998), less suitable.

While the author does not encourage as a general practice the substitution of clinical assessments by other forms of assessment, it should be considered that adopting the IES in overwhelmed and under-resourced New Zealand accident and emergency (A & E) departments would be a step in the right direction. Currently, MVA survivors may not receive any psychological attention (probably even more so if there is a lack of serious injury) in New Zealand A & E departments; consequently, the use of the IES or a similar psychometric tool may bring to the attention of health professionals individuals who require psychological monitoring. The alternative is that New Zealand road accident survivors, particularly from minor accidents, go unnoticed and at risk for continuing psychological adversity.
In regard to findings from the Cycling Accident Fear Questionnaire (CAFQ) and the Questionnaire on Perceived Impact of Cycling Accident (QPIC) the following was of note. Just under half of the participants (12) reported on the CAFQ that they feared for their life during the accident. This is significant because it has been noted that threat to life is indicative of PTSD. The predictive power of this variable in the current study will be discussed later. Of note, a number of cyclists reported that they are now nervous and/or distressed before or while cycling and driving. This was supported by a considerable number of significant others observing the same behaviours in the cyclists, as well as noting that some of the cyclists were on edge or agitated. The implications of this are that, firstly, it illustrates that the distress experienced by the cyclists has generalised to other areas, that is, their driving behaviour. Secondly, and most significant, is that these individuals are now suffering from anxiety symptoms while they are cycling, driving, or are in a vehicle.

This anxiety has the potential to interfere further with these individual’s lives, as well as others’ safety. That is, while cycling or driving, increasing levels of anxiety may interfere with the person’s concentration and, therefore, driving capability. For example, if the person is experiencing nervousness or distress, such as thoughts about another accident or an exaggerated startle response (e.g., hitting the brake pedal hard when unnecessary), they may in fact be escalating the risk to their own road safety and to the safety of others. To illustrate this point, participant 23 reported that when he now drives past the intersection where his accident occurred he is worried that a car may pull out in front of him. Further, as passengers, their nervous behaviour, such as hypervigilance, may distract the driver. Participant 18 noted “jumpiness” when in a car following her cycling accident, as both a driver and a passenger. She recalled that she was concerned that someone would pull out in front of her or would go through a stop sign. Of note, seven (26%) of the cyclists were described by their significant others to be nervous when seeing other cyclists on the road.

This difficulty, of course, applies also when they are cycling. A nervous cyclist who perhaps reacts inappropriately when on the road has the potential to create further road accidents. For example, hypervigilence may lead to swerving needlessly because they believe there is a car approaching quickly from behind. Participant 8 highlighted this concern, in stating that he now feels overly cautious and nervous which "makes
him vulnerable to more accidents.” A number of other cyclists reported similar behaviour (participants 9, 10, 15, 21). In fact, participant 9 noted that she thinks she sees cars when she is cycling when in reality there are none. One point of interest was that participant 12 wanted to keep her anxiety levels up so that she remained vigilant during road use.

A considerable number of the cyclists were noted to be behaving in ways that are consistent with PTSD-type symptoms, as noted on the CAFQ and QPIC. Firstly, it was found that avoidant behaviours were quite prevalent. Ten (37%) participants noted that they avoided cycling at least some of the time. Further, seven (26%) were noted by their significant others to be avoidant of cycling. Significant others also reported that a number of the cyclists were avoidant of busy roads, cycling or driving near the accident site, and avoidant of discussing the accident. Sleeping behaviour was also noted to be disturbed following their accidents. Seven (26%) cyclists were noted, on the QPIC, to have had sleeping difficulties since their accident.

Accordingly, on the CAFQ, seven of the participants had reported having nightmares about their accident. Approximately one-quarter (26%, n = 7) of the participants were noted to be depressed, at least some of the time, since their accident. Further, around one-fifth (19%, n = 5) reported being either more irritable or angry than normal since their accident. In addition, 22% (n = 6) were noted to be more anxious or nervous than normal since their accident. Overall, these findings endorse the view, advanced earlier, that cycling accident victims are susceptible to developing psychological distress, both behavioural and emotional, which is comparable to other road accident and trauma survivors.

The Cycling Accident Interview (CAI), based on Blanchard and Hickling’s (1997) Motor Vehicle Accident Interview, revealed an extensive amount of information about the cyclists, their accidents, and post-accident functioning. A substantial amount of the information gathered in these interviews was reported in the Results and Case Reports sections. A considerable number of the cyclists reported both anxiety and avoidance following their accidents. As noted above, from other measures, it is apparent that levels of anxiety and avoidance were frequent in this sample. The CAI corroborated these findings.
Concerning avoidance associated with post-accident cycling behaviour, the participants reported considerable levels of avoidance during the month after their accident and at the time of the interview. For example, 18 (67%) of cyclists reported avoidance of cycling on busy roads at both times. Specifically, only five participants (19%) remained non-avoidant at both times. Overall, it appeared for most, that the levels of avoidance decreased between the two periods. For instance, 12 (44%) of the cyclists initially avoided cycling at night; in contrast, seven (26%) reported this behaviour at the time of the interview. Nonetheless, there were cyclists who initially had little or no avoidance and then experienced it later on. For example, one cyclist (participant 24) who was not initially avoidant of cycling near their accident site became avoidant at the time of the interview. Further, two cyclists (participants 12 & 22) who were not initially avoidant of cycling on busy roads became avoidant around the time of their interviews. The rationale for this may be that generalisation of avoidance to other stimulus (road conditions) and the presence of anxiety in these individuals was delayed, similar to a delayed-PTSD reaction. On the other hand, perhaps thoughts focusing on involvement in this study elicited some anxiety that manifested in avoidance of certain stimulus, including cycling conditions.

It may be questioned why cycling avoidance is significant. Firstly, it needs to be noted that for many of these individuals cycling was their principal mode of transport. Thus, being avoidant could affect both their travel to work and to social activities. In this sample, four (15%) cyclists (participants 8, 12, 13, 16) reported that they had restricted social activities as they involved cycling to and from the venue or involved cycling while there. Therefore, these individuals had observed that their accidents had a detrimental effect on their social lives, thus lessening their quality of life. Certainly if this avoidance became severe enough it could lead to social isolation as well as peers perceiving the individual to be difficult or irrational. Secondly, avoidance could result in the individual being less flexible and more rigid concerning road use. That is, besides cycling activity, some of the participants noted being avoidant of driving. This could foster difficulties in both the home environment and with work. For example, if the individual was a parent it could make it problematic to provide transport for their children and place undue stress on their partner. Thirdly, avoidance could be serious enough to mean significant life adjustments. For example, participant 2 reported that since her cycling accident she had moved closer to her place of study and place of
work so that she could walk or bus to these locations, rather than cycling. Consequently, her cycling accident resulted in her moving house, which suggests further stress has been experienced.

With reference to levels of anxiety, the information collected in the CAI revealed that the participants in this research often experienced anxiety in a number of situations. Indeed, it was noted that 24 (89%) of the cyclists currently feel vulnerable when they are cycling. Some of the conditions that the cyclists felt anxious in included cycling at night, in the rain, on busy roads, and near the accident site. In these conditions, and others like them, a number of individuals, in addition to those avoiding the situation, were anxious. For example, in the month following their accidents, out of the 24 participants to whom the question 'cycling on busy roads' was relevant, five were avoidant and 15 (15/24; 63%) noted anxiety some of the time or more often. At the interview, the query was relevant to 26 participants. Of this number, two were avoidant and 20 (20/26; 77%) reported anxiety some of the time or more often. Therefore, it is apparent that anxiety levels were substantial. Further, the increase from those with anxiety initially until the interview is attributable to those who were initially avoidant of returning to road use. It was discussed earlier how anxiety may influence a cyclist or driver's ability to perform safely on the roads. Consequently, post-accident anxiety in cycling accident victims has potentially serious implications not only for the cyclists themselves but for others on the road.

In addition, two-thirds (18) of the cyclists reported anxiety in other conditions, such as when near car doors, on roundabouts, when discussing the accident, and when seeing other cyclists on the road. One area that accident-related anxiety generalised to involved the cyclists' families. Specifically, three participants (9, 22, 24) described being anxious in relation to their children, or other young family members, using the road. For instance, participant 24 recalled that he often questioned his 10-year-old son about his cycling route and he often accompanied him. He noted that he actually wanted to stop his son from cycling completely. Besides these participants, participant 3 recollected that he "projected his anxiety" onto his partner when they were cycling. Accordingly, not only does the anxiety experienced by cycling accident victims have the capability of interfering with their road use behaviour, it may generalise to become a problem in the home by affecting the way that they interact with others.
around them by causing them to be overly protective about road use. This is in addition to the other post-traumatic symptoms that the individual may be trying to cope with.

A number of other issues of interest came through in the interviews with the cyclists. One of particular importance is that of "road rage". Two participants reported being involved in accidents that included being pursued by an individual in a car. Participant 24 reported an incidence of "road rage". He noted that a car followed him onto a grass verge and an ensuing verbal confrontation occurred. He recalled feeling extremely threatened, perhaps attributable to the fact that no one initially in the passing traffic came to his aid, and was left upset in tears after the incident.

Another participant (participant 21) recollected that someone that eventually swiped her with their car had chased her. On interview, this participant presented with a predominant focus on this aspect of her accident. Certainly, she was perplexed about why someone would want to hurt her. The apparent malicious aspect of this accident has had great impact upon her, to the point that she reported being "paranoid" during road use and, subsequently, required several people around her in order to feel secure when on the road. Further, she has become fixated about the unidentified driver of the car involved in her accident and currently searches for him/her when in public. She added that she also has lost her confidence in a number of areas. It could be argued that the unpleasant aspects of this accident may generalise to other parts of this person's life. As noted, her confidence has been affected in a number of areas, thus, it is possible that she also could become paranoid and fearful of being away from people in other situations besides road use (e.g., at home or at work). This could have serious repercussions for both her and her family.

An additional point in regard to "road rage" is that it may be a result of being in an accident as well as a precursor. That is, it may be that the accident may lead to those involved becoming more aggressive road-users following their accident. Undeniably, a number of the participants reported being angry at the time of their accident, which for many is an appropriate reaction. Certainly, as noted in the literature review, anger is evident in road accident survivors (Hobbs & Mayou, 2000; Kuch et al., 1996). In addition, others noted being more defensive and assertive road-users post-accident,
which may not be a maladaptive behaviour. However, at what point does secondary anger become dysfunctional and develop into “road rage”? In this sample, aggressive road behaviour was observed, post-accident, in some of the participants. The most conspicuous example was participant 13 who reported feeling rage at times since his accident. He stated that he periodically wants to be verbally abusive to drivers and kick their cars. In actual fact, he noted that recently these urges surfaced and he verbally abused a driver. Given that anger and irritability may occur following a traumatic event, there is the potential that these symptoms in combination with residual anger may increase the likelihood of aggressive road use behaviour occurring. This highlights a crucial issue that would need to be addressed in post-accident therapy, if indeed, the accident victim is identified as ‘at risk’ in the post-accident period.

Another element that emerged from the interviews, that was in fact a positive aspect, was that many of the participants reported that the interview process was somewhat therapeutic. That is, a considerable number of the participants viewed involvement in this study as an opportunity to talk openly about their accident. While some noted anger towards drivers and other road-users, the general sentiment was relief at being given the chance to speak freely about their accident and how it had affected them. As discussed in the earlier review, Best and Ribbe (1995) pointed out that allowing an individual to tell their “…story can have tremendous therapeutic benefits” (1995, p. 319). While the aim of this research was not treatment orientated, it was salient that the interview did indeed generate some aid in terms of healing.

Best and Ribbe (1995) further noted that allowing the accident survivor to discuss the accident with the interviewer conveys to them viewpoint that the interviewer wants to empathise with them. Moreover, it expresses to the accident survivor that it is actually “okay” to talk over the accident, which to them may have been a horrendous incident, and their subsequent emotional response (Best & Ribbe, 1995, p. 319). This may be in contrast to the response and communication they received from others (Best & Ribbe, 1995). The researcher believes that with this group the above points may be significant. In other words, while motor accident survivors may be reluctant to discuss their accidents or seek help given that they may be viewed as weak or histrionic, this may be more pertinent to cyclists as a “bike accident” to many may seem
insignificant. Largely, taking into account the relief that many of the participants expressed about being able to discuss their accident, and the outlook, for some, that others had not understood their reaction, it appeared that cycling accident survivors do indeed go unrecognised and unheard. This is consistent with other road accident victims who are not acknowledged.

Regarding predictors, it has been found in other research, as discussed extensively in the literature review, that certain variables may have a bearing on the development of post-accident psychopathology. These variables included severity of injury, threat to one's life in the accident, a sense of a loss of control during the accident, a previous psychological disorder, and litigation. The current study analysed whether or not the following variables, severity of injury, feared for life during the accident, and a sense of a loss of control during the accident, contributed to moderate to high IES scores. No significant predictors were found in this research. Nonetheless, given the small sample size it was expected that this might be the case. However, there was a trend for a sense of a loss of control to contribute to IES outcomes but this was not significant. If the sample size was larger, this may have reached significance levels. Despite this, other research has revealed that these variables do contribute to post-accident psychopathology, although the exact nature of this relationship remains unclear. Still, these factors need to be acknowledged in the assessment, treatment, and research of accident survivors.

Furthermore, some of these predictive variables may be particularly noteworthy in cycling accident survivors, for instance, the threat to one's life and severity of injury. In regard to threat, taking into consideration that a cyclist's only protection on the road, if they chose to wear one, is a safety helmet (a legal requirement in New Zealand), cyclists may be more likely to recognise the danger or vulnerability they are in when in an accident. Undeniably, due to their lack of physical protection and the fact that they are less visible to motorists than other vehicles, cyclists are at a greater risk of injury than other car occupants (LTSA, 2000a). Further, the disparity between the size of a cyclist and the bulk of a motor vehicle, along with the factor of speed, may lead to the obvious subjective belief of impending peril, including fear of serious injury or death. This may heighten the prognostic power of threat to one's life in the cycling accident population. With reference to severity of injury, many of the same
factors noted above apply. Namely, cyclists are extremely vulnerable road-users due to their lack of protection, lack of size, and traffic speeds. Thus, it could be argued that these individuals are more prone to serious injury as their bodies are exposed to impact with potentially large vehicles possibly moving with great velocity. Therefore, the combination of these predictors in this population may be of principal importance in the areas of research, assessment, and post-accident psychological intervention.

While the impact of cycling accidents, and the potential ensuing psychological distress, have been discussed mainly in relation to post-accident road use (i.e., anxiety and avoidance), the broader influence of post-accident psychological suffering has not been considered. That is, if a cyclist experiences post-traumatic symptoms, what are the implications for their home, work, and social environments? Hickling, Blanchard, Mundy, and Veazey (1999) pointed out that while research attention has addressed the psychological impact of road accidents, very little has been recorded on the psychosocial consequences. They reported that Mayou et al. (1993) was the only prior study that appeared to examine this area. Mayou et al. (1993) reported that those road accident survivors with PTSD had higher levels of impairment on measures of leisure and the impact on work. Hickling, Blanchard, Mundy, et al. (1999) found in their research that those with PTSD and subsyndromal PTSD, following a road accident, had significantly less close family relationships than controls who had not been in a road accident. Further, those with PTSD were found to have poorer interactions with friends, and less ability to enjoy and participate in recreational activities. Moreover, Hickling, Blanchard, Mundy, et al. (1999) stated the following in regard to those who experience PTSD, following a road accident, “The quality of their life is significantly impacted and the ability to draw support from significant aspects of their life including family, friends, work, and pleasurable outlets, are all significantly diminished” (p. 215).

The present study estimated that between 15% and 22% of the participants were likely to have PTSD. Further, it was found that 37% of the sample were experiencing considerable levels of psychological distress. Thus, given the findings of Hickling, Blanchard, Mundy, et al. (1999) and Mayou et al. (1993), it is likely that a substantial number of individuals in the current study had psychosocial functioning that was worse post-accident than before. In support of this point, it was noted earlier that
some of the cyclists had reported less social activity due to their accidents and subsequent avoidance. Further, considering that the participants reported a number of post-traumatic symptoms on the IES (e.g., 52%, 14/27, noted frequent intrusive thoughts), it is probable that these symptoms will interfere with their capacity to perform at work or in other areas of life. For example, intrusive thoughts could disrupt concentration levels while working and may lead to irritability with family members or with peers.

Without a doubt the occurrence of clinical or subclinical post-traumatic symptoms, and the high frequency of comorbid or other diagnoses, bring with them serious implications for a road accident survivor’s behavioural, cognitive, and emotional functioning. While trying to cope with these conditions, the impact may range from anger to severe depression, alcohol and substance abuse to sleep disturbance, and so forth. These symptoms not only affect the individual but also how they interact with those around them, disrupting interpersonal relationships and causing additional stress in the home and at their place of employment or study. Secondary difficulties such as relationship strain, financial concerns, and social isolation may be generated as a result of being in a road accident. Thus, this study suggests that cycling accident victims, like any other trauma survivors, are just as vulnerable to subsequent psychological adversity.

While the focus of this research has primarily been related to psychological distress following a road accident that manifests as anxiety or post-traumatic stress symptomatology, it is important to recognise that distress following a traumatic event may be expressed in other ways. Comorbidity with PTSD aside, post-trauma distress may emerge as depression, a range of anxiety disorders, or other psychopathology. Indeed, McFarlane and Potts (1999) emphasised that focusing only on PTSD may lead to not recognising the occurrence of other significant psychological distress. Feinstein, Owen, and Blair (2002) noted that the four most common conditions following life-threatening events included PTSD, major depression, substance abuse, and dissociative presentations. Of note, Lazarus and Folkman (1984) reported that impaired social functioning, decreased confidence, and poor somatic health are the usual negative consequences from an inability to cope with mild stressors. Certainly, such sequelae may result in social anxiety, depression, and somatisation.
Research has shown that distress following a traumatic event may contribute to the development of a number of psychiatric disorders. For example, Van Ommeren et al. (2001) studied 418 tortured Bhutanese refugees in Nepal. They found that besides PTSD these individuals exhibited high rates of persistent Somatoform Pain Disorder, Dissociative Disorders (amnesia and conversion), Generalised Anxiety Disorder, and affective disorders. Other studies (Brown, Fulton, Wilkeson, & Petty, 2000; Freedman et al., 2002; Hexel, & Sonneck, 2002; Maes et al., 2000; McDermott, & Palmer, 2002; Safren, Gershuny, Marzol, Otto, & Pollack, 2002; & Wilson, Poole, & Trew, 1997) have found that traumatic experiences and consequent distress have contributed to a number of disorders other than PTSD, such as Generalised Anxiety Disorder, Panic Disorder, Agoraphobia, Social Phobia, Specific Phobia, Major Depressive Disorder, Bipolar Disorder, Substance Disorders, and Psychotic Disorders.

In regard to children, March (1999) noted child survivors often display symptoms of distress, following a traumatic event, related to other disorders than PTSD. For example, March (1999) noted that children may experience attachment concerns (e.g., worries family members may come to harm) following a traumatic event and that others may be vulnerable to separation anxiety because of threats to their attachment with their caregiver resulting from the traumatic event. Further, March (1999) reported that a child’s distress following an upsetting event may not meet diagnostic criteria for PTSD but may manifest as Generalised Anxiety Disorder. Nader and Fairbank (1994) made the point that a child may experience somatic symptoms as a form of re-enactment, which may be similar to a limited Panic Attack that may develop into Panic Disorder. Certainly, trauma-related distress may be associated with Specific Phobia, i.e., the upsetting event triggers distress and consequent anxiety symptoms and avoidance. In summary, March (1999) noted that distress related to a traumatic event may lead to disruptive behaviour disorders, grief and depression (particularly if a loved one died in the event), self-mutilation and sexual and/or aggressive behaviour (related to abuse), suicidal behaviour, exacerbation of learning disorders, and Adjustment Disorder.

Consequently, it is apparent that future research into road accidents in New Zealand (and elsewhere) will need to explore other mental health conditions related to distress that may develop from such trauma rather than focus on PTSD type presentations.
alone. For example, Mayou et al. (1993) reported from their research that one tenth of road accident victims had a mood disorder at one year post-accident and that there were elevated levels of phobic anxiety about travel in their sample also. Further, Blanchard and Veazey (2001) reported in a recent literature review that there are four primary psychiatric disorders that may result from road accident involvement: PTSD, ASD, major depression, and other anxiety disorders including driving phobia. Of note, Harvey and Bryant (2002) reported that there is "little justification for the ASD diagnosis in its present form....evidence indicates that alternative means [other than ASD] of conceptualizing acute trauma reactions and identifying acutely traumatized people who are at risk of developing PTSD need to be considered" (p. 886). Nonetheless, as road accident research in New Zealand develops, the role of distress in the development of other mental health disorders, besides PTSD, needs to be explored.

One final point needs to be made that concerns the health care system. That is, the financial cost that anxiety has on health care resources, especially unrecognised anxiety. Ten percent of all general practice costs in the United Kingdom are accounted for by patients with anxiety disorders (Andrews, Crino, Hunt, Lampe, & Page, 1999). Further, Andrews et al. (1999) stated that until recently anxiety was viewed as a minor disorder and patients were often told nothing was wrong or given sedatives to reduce their complaints. Greenberg et al. (1999) noted that anxiety disorders, from a societal perspective, are related to considerable costs, more than half of which is attributable to "nonpsychiatric direct medical expenditure" (p.431). Further, in their research they reported that in 1990, in the United States, each sufferer of anxiety consumed $1,542.00 US dollars in medical costs (10% of this in indirect workplace costs). Greenberg et al. (1999) go on to state that, "The results [from their study] demonstrate, from a societal perspective, not only that anxiety disorders are associated with substantial cost, but that more than half of the costs of these disorders are attributable to nonpsychiatric direct medical expenditures.... To the extent that this particular cost distribution results from inappropriate or inefficient treatment of undiagnosed and misdiagnosed sufferers, a substantial portion of the overall economic burden of anxiety disorders can be avoided" (p. 431/433).
Greenberg et al. (1999), importantly, noted that inappropriate expenses that are generated from the nontreatment of anxiety are more likely to continue over the long term. Therefore, while proactive treatment of people with anxiety may lead to a short-range escalation in societal costs, these would be decreased in the long-term (Greenberg et al., 1999). That is, much of the costs of anxiety "may be avoidable with more widespread awareness, recognition, and appropriate early intervention" (Greenberg et al., 1999, p. 427). Lastly, according to Marshall, Jorm, Grayson, and O'Toole, (2000), PTSD alone has been found to be related to sizeable medical costs in Vietnam veterans with this disorder, 60% higher than the average cost for individuals in their sample of Vietnam veterans. Marshall et al. (2000) stated that the possible rewards for the effective prevention and treatment of PTSD are better appreciated when the health care costs, along with the economic and personal costs, of PTSD are considered. Thus, when considering the findings in the present study, it is argued that road accident victims with unrecognised anxiety, including PTSD, may go on to inadvertently consume considerable health care resources.

In conclusion, this study provided evidence that cycling road accident victims experience levels of post-traumatic psychological distress that is comparable to the levels of psychopathology found in other road accident survivors. Approximately one-third of the participants in the current study were found to be enduring moderate to high levels of psychological distress. Further, between 15% and 22% were expected to meet a PTSD diagnosis. If generalised to New Zealand cycling injury statistics, 229 people would be expected to be experiencing substantial levels of psychological distress. This could have serious repercussions on their post-accident road use behaviour and psychosocial functioning. In addition, unrecognised subsequent anxiety, and other psychopathology, could place substantial demands on an already stressed public health system. Certainly, more awareness of road accident psychological sequelae, including in cycling accident victims, will prevent further, unnecessary depletion of this country's health resources. More importantly, early detection of post-accident psychological adversity will enable the affected individual to receive the intervention they require without having to endure needless and ongoing psychological suffering. Lastly, considering that cycling is promoted and regarded as an ecologically beneficial means of transport (CCC, 2000; Munster et al.,
2001) it is unfortunate that such an environmentally benign activity can have such serious psychological consequences for the cyclist.
PART THREE:

STUDY TWO
PART III
STUDY TWO: PSYCHOLOGICAL DISTRESS IN CHILDREN AND ADOLESCENTS FOLLOWING ROAD ACCIDENTS

3.1 INTRODUCTION

3.1.1 Literature Review: Accident Research on Children & Adolescents

According to Koch and Taylor (1995), motor vehicle accidents (MVAs) frequently result in clinically significant psychological consequences. The psychological sequelae may include comorbid psychological and physical disorders. The most common psychological conditions are anxiety related post-traumatic stress disorder (PTSD; see Table 2, p.9), depression, pain-related conditions, and phobic avoidance of accident related stimuli. However, it is only in recent years that clinical attention has focused on the study of road trauma and its subsequent psychological impact on children and adolescents following a road accident (Stallard, 1999). This review will discuss the literature and research findings on child road accident-related victims in regard psychological sequelae.

It is apparent from the lack of published research on this topic that there is limited knowledge and information about how a road traffic accident (RTA) may effect a child or adolescent (Jaworowski, 1992; McCloskey & Walker, 2000; Taylor & Koch, 1995). Further, Stallard (1999) points out that regardless of an emerging interest in child RTA survivors, large-scale studies have been slow to appear. Given that RTAs are the most common source of daily trauma and that children are especially vulnerable road-users (Di Gallo & Parry-Jones, 1996), this lack of knowledge about RTAs and their subsequent psychological effect on children and adolescents appears a serious oversight. Nonetheless, a number of studies over the past decade have begun to build a knowledge base about how a child may be effected by involvement in a RTA (Jaworowski 1992; Jones & Peterson 1993; Mirza, Bhadrinath, Goodyer, & Gilmour, 1998; Stallard & Law, 1993; Stallard, Velleman, & Baldwin, 1998; Stallard, 1999).

These studies, and comparable research, have noted a wide range of psychopathology in children following a RTA. Early reports of the psychological effects of RTAs on children
were in the form of case reports (Jones & Peterson, 1993). Jaworowski (1992) presented three case vignettes of children involved in RTAs. One of the children, aged six, developed feelings of omnipotence and invulnerability following his accident. That is, a belief that he would not be involved in future accidents because "...all of the drivers know that I have already been in an accident before" (cited in Jaworowski, 1992, p.180). His play contained repetitive themes related to his accident. Another child, aged six, displayed nocturnal behavioural problems, including aggressive outbursts toward family members and enuresis that began following the accident.

Jones and Peterson (1993) discussed the case of a three-year-old girl who was diagnosed with PTSD following involvement in a minor automobile accident. The child sustained no physical injuries during the RTA. Following the accident the child experienced nightmares every three or four nights and would repeatedly scream until woken. In addition, when awake she would cry and tremble whenever she saw large trucks, cars, or motorcycles. She also was reluctant to travel by car and her parents noted that her play became more violent. Thompson, McArdle, and Dunne (1993) reported on three children, aged 4, 11, and 13, who had been involved in RTAs. They noted symptoms that included separation anxiety, nightmares that involved reliving the accident, sleep disturbance, fear of the dark, preoccupation with road safety, and reluctance to travel by car or to cross the road.

Other research has utilised larger sample sizes. Malt, Hoivik, and Blikra (1993) presented data from a three-year retrospective follow-up study that had not previously been published in English. The study, which contained 51 children injured in RTAs, found that 7.8% had behavioural problems and 4.1% had impaired playing ability. More recently, Di Gallo, Barton, and Parry-Jones (1997) conducted research on 57 RTA victims aged 5-18 years. The study included an assessment at 2-16 days post-accident followed by a further assessment after 12-15 weeks. The researchers found that PTSD symptoms occurred at both the assessment times. They noted that even though there was a decrease of symptom severity between the interviews, that a substantial number of participants still suffered from accident associated psychological symptomatology. In fact, at the later interview 14% still experienced mild to severe PTSD and 17% had serious traffic-related fears.
Further, parents noted that their children exhibited increased mood disturbances in contrast to their pre-accident status.

Mirza et al. (1998) reported on 119 children aged 8-16 who were involved in RTAs and subsequently presented to an emergency department. They noted at six weeks post-accident that 45% of the participants displayed PTSD symptoms. The most frequent symptoms being intrusive recollections about the RTA, hypervigilance, distress when exposed to stimuli that were similar to aspects of the RTA, feeling or acting as if the RTA was re-occurring, exaggerated startle response, and avoidance of feelings and thoughts related to the traumatic event. Other less frequent symptoms included physiologic reactivity, sleep disturbances, irritability, concentration difficulties, feelings of detachment, sense of foreshortened future, lowered interest, and restricted affect. At six-month follow-up, 23% still displayed symptoms that would indicate the presence of PTSD. The researchers also noted a high incidence of comorbid disorders, such as major depressive disorder and anxiety disorders, in those that presented with PTSD.

Research on 28 children involved in a bus accident was performed at one year post-accident and again at three years post accident by Winje and Ulvik (1998). Ten of the children were passengers in the bus when it crashed resulting in multiple injury and sixteen deaths. The other 18 children were at home at the time of the accident; however, 13 of these children experienced the loss of a family member in the accident. The average age of the 28 children was 13.2 years. At one year post-accident three-quarters presented with specific symptoms of PTSD. Further, following an interview, a child psychiatrist noted that three-quarters of the children had a significant anxiety reaction and half the sample had a marked depressive reaction. Half the sample reported reduced school performance that was strongly related to concentration and memory difficulties. Sixty-one percent of the children reported headaches, while 20-40% noted sleeping difficulties, tiredness, stomach pain, and appetite problems. At the three-year follow-up, tiredness, stomach pain, and appetite problems were noted in some of the children. However, no clinically significant conditions were noted at this time.

Ellis, Stores, and Mayou (1998) reported on psychological changes in the months following a RTA in 45 school aged (6-16 years) children who had been to an Accident
and Emergency department. They found that a number of the children displayed short-term psychological sequelae, including nightmares, concentration difficulties, reliving the accident, recognition of their mortality, guilt, and extreme fear of traffic. After 4–7 months, parents considered that 33% of the children had a moderate reaction and a further 11% were noted to be severely affected. Ellis et al. (1998) recounted that the children had high levels of post-traumatic stress symptoms. Parents reported that avoidance type symptoms were more common (in over 50%) than intrusive thoughts. Further, travel anxiety was found in 39%, 23% noted depression, and 14% noted high levels of anxiety. Of importance, the children's parents reported that these symptoms had occurred since the RTA and frequently increased with time. Parents noted the following in their children during this period also: sleep difficulties (17%), accident associated fears, irritability, anger, regressive behaviour (e.g., soiling), and clingingness. Overall, 18% of the parents believed "that their child's behaviour had changed for the worse since the accident" (p. 65).

McDermott and Cvitanovich (2000) reported on 26 participants aged 8-13 years who presented to an emergency department following involvement in a RTA. The participants were assessed three months after their RTA. The researchers reported that a higher occurrence of psychopathology was found in the RTA sample when compared to controls. Twenty-two percent were in the moderate to severe PTSD range and 35% were in the mild range of PTSD according to self-report. They noted that their RTA population presented with higher rates of emotional and behavioural problems than was seen in a comparable population as measured by the Child Behavior Checklist (CBCL; Achenbach, 1991; McDermott & Cvitanovich, 2000).

Researcher Paul Stallard has been involved in a number of studies and reports focusing on children involved in RTAs (Stallard & Law, 1993; Stallard & Law, 1994; Stallard et al., 1998; Stallard et al., 1999; Stallard, 1999). An initial study assessed seven children, mean age 15.6 years, involved in a school minibus accident (Stallard & Law, 1993). It was noted at six months post-accident that most of the children were enduring significant psychological distress, despite acquiring only minor injuries during the RTA. All the children conveyed feelings of acute anxiety, panic attacks, and increased vigilance when travelling in vehicles. They also stated that they were having difficulties talking with their
parents. They indicated that they had difficulty concentrating at school, which was mislabelled as laziness, thus, adding to the stress suffered by these children. Further, the children reported that their experience of the casualty department, following the minibus accident, produced significant and needless anxiety. The children's perception of an uncaring attitude from the hospital and school, combined with insensitive press, led to feelings of anger.

Stallard et al. (1998) explored psychological distress in 119 children, aged 5-18 years, who attended an accident and emergency department following a RTA. A group consisting of 66 sports-injured children was employed to control for the potential influence on psychological distress of attending the hospital. The children were assessed six weeks post-accident. Based on a semi-structured interview, 34.45% of the RTA participants met the diagnostic criteria for PTSD (Stallard, 1999). In contrast, only 3% of the sporting injured participants met the diagnostic criteria. Other psychometric scores indicated that approximately one in seven of the children experienced clinically significant anxiety and depressive disorders (Stallard, 1999).

Of note, 40% recounted changes in their sleeping patterns, the most common being difficulty getting to sleep and dreams associated with their RTA. In addition, emotional changes were described including tearfulness (23.5%), and feelings of anger and intolerance of others (17.1%). Stallard (1999) reported that 26.9% noted travel associated anxiety and 50.4% stated that they were frequently distressed by accident related thoughts. Of importance, one-third of the participants had significant changes in relationships. However, Stallard (1999) noted that these were not always negative changes as a number of the children reported becoming closer to their friends. Nonetheless, a quarter of the children recounted feelings of estrangement or distance from others following their accident.

In addition, Stallard, Velleman, and Baldwin (2001b) reported that of the 41 children from the above study, who met a PTSD diagnosis at six weeks, 21 agreed to take part in a further study. They found that, out of these 21 children, 10 continued to meet PTSD diagnostic criteria at eight months. Stallard et al. (2001b) reported that those children who had not talked about their accident with anyone were more prone to feel that their
traumatic event had not been understood. Further, these children were more predisposed to being diagnosed with PTSD at eight months post-accident. There was a significant association found in this sample between recovery from PTSD and talking about the accident. However, the nature of the accident or the severity of injuries was not significantly related to PTSD at six weeks or eight months (Stallard et al., 2001b). Nonetheless, those children who had not recovered from their injuries at eight months were more likely to meet a PTSD diagnosis than those who had recovered.

A recent study by de Vries et al. (1999) took a distinctive approach to PTSD in children following a RTA. They assessed PTSD in both children and adults after paediatric traffic injury. The sample consisted of 102 children (ages 3 – 17 years) and 102 parents. They assessed the prevalence of PTSD in parents who were both present and not present at the RTA. Overall, 25% of the children and 15% of the parents fulfilled a PTSD diagnosis. Further, de Vries et al. (1999) stated that, “Regardless of diagnostic status, 49% of the children and 44% of the parents were reported to have at least minimal impairment from posttraumatic symptoms” (p. 1295). Incorporated in these percentages are 12% of children and 9% of parents who exhibited exceptionally problematic symptoms. Importantly, it was noted by the researchers that the high occurrence of PTSD in this study suggests that RTA-related injury may end in case prevalence of PTSD in children comparable to those rates found in children who experience violence (de Vries et al., 1999).

According to de Vries et al. (1999), it was found that parents who witnessed or who were in the RTA presented with a higher incidence of PTSD than those who were not involved. However, while 47% of those parents who witnessed the RTA met PTSD criteria, it was found that 9% of those not present still fulfilled a PTSD diagnosis (de Vries et al., 1999). Thus, this study calls to attention the broader impact of RTAs, that is, the potential affect on parents’ and other family members’ psychological wellbeing, as well as the child’s psychological condition. Two further points need to be noted from this study. Firstly, injury severity was not significantly associated with child or parent PTSD diagnosis. Secondly, from this sample only a quarter (25%) of parents had sought assistance for their child and only 12% had pursued help for themselves. Help-seeking included sources such as friends, family, and clergy, as well as professional help. Without undervaluing some of
these helping sources, the question of how beneficial they were remains unknown and questionable.

3.1.2 Current Study
The current study will focus on the important area of psychological sequelae for children who have been involved in road accidents in New Zealand. In the year ended December 31st 1999, 3,325 people, aged 19 years and younger were reported injured on New Zealand roads (LTSA, 2001). From this total 217 were aged under 5 years; 363 were aged from 5 years to nine years; 632 were aged 10 to 14 years; and 2113 were aged 15 to 19 years. For the 12 months to August 2000, 1,216 children, aged less than 15 years were reported injured on New Zealand roads, and an additional 43 children were killed (LTSA, 2001). From this total the following was noted- 23 were drivers, 656 were passengers, 13 were motorcyclists, 332 were pedestrians, 188 were cyclists, and the remaining four were due to other causes.

As noted earlier this is a substantially under-researched area and this project will contribute to a better understanding of this group’s reactions to road-accident-related trauma. Moreover, the researcher is unaware of any similar studies that have been performed in New Zealand. While a child’s physical injuries incurred from a traffic accident are addressed without hesitation, the impact of the accident on the child’s psychological wellbeing is often overlooked and unrecognised. Thus, this project will highlight this issue and assist significantly in the recognition of this mental health concern. In addition, the researcher believes that an enhanced awareness of this issue in New Zealand will aid in the secondary prevention of mental distress in children, such as clinical or sub-clinical symptoms of PTSD, depression, anxiety, and other psychological phenomena.
3.2 METHOD

3.2.1 Participants

3.2.1.1 Participant Characteristics
Participants were 16 children and adolescents, living in New Zealand, aged from eight to 17 years of varying ethnicity who were involved in a road traffic accident within the past 24 months. A further three participants were included in part of the research. That is, these three participants chose not to be interviewed, however, their parents completed questionnaires concerning them. The age range was determined from the age range set by the assessment procedure. The Trauma Symptom Checklist for Children – Alternate version (Briere, 1996b), a self-report measure used in this study is intended for children aged eight through 16 years. One participant turned 17 during the recruitment period but was included in the sample. Further exclusion criteria specified that any participant, if knocked unconscious during the accident, was unconscious for no longer than 15 minutes. The maximum of 15 minutes was based on research criteria used by Mayou et al. (1993) and Mayou, Black, et al. (2000) in their research on road accident survivors.

3.2.1.2 Participant Selection
Participant selection was by non-random self-selection over a six-month period (November 2000 – April 2001). The families involved in this study responded to a number of articles printed in newspapers in the main centres of New Zealand (see Appendix M). In addition, small advertisements were placed under the Public Notices section of newspapers in the four main centres (Auckland, Wellington, Christchurch, and Dunedin) on a number of occasions (for example see Appendix N). Lastly, a recruitment poster and letter were posted out to 100 general practitioners’ offices in the Christchurch and Dunedin city areas (see Appendix O). All of the participants lived in New Zealand, a country with a reported population, in 1999, of 3,811,000 (Statistics New Zealand, 2001). Eight participants were from the South Island and eight from the North Island. Of the three participants who chose not to be interviewed, two were from the North Island and one was from the South Island.
3.2.2 Questionnaires/Measures

3.2.2.1 The Child Behavior Checklist for Ages 4-18 (CBCL/4-18: Achenbach, 1991)

The CBCL was employed to assess a parent or caregiver's perceptions of their child's behaviour. The CBCL measures both social competence and behaviour problems in children aged between 4 to 18 years. Social competence is measured from items on three scales: Activities, Social, and School. A T score below 30 on any of the competence scales is considered to be in the clinical range, whereas, a T score in the 30-33 range indicates the borderline clinical range. A total competence score is also computed and generates T scores for each range: below 37 is the clinical range and scores in the 37 to 40 span are in the borderline clinical range.

Child behaviour is evaluated from 118 items that include both internalizing and externalizing behaviors. Items on these scales are scored as 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). These items generate eight core syndromes. The internalizing syndromes are: Withdrawn, Somatic Complaints, and Anxious/Depressed. The externalizing syndromes are: Delinquent Behavior and Aggressive Behavior. The following three syndromes do not fall under either externalizing or internalizing behaviour: Social Problems, Thought Problems, and Attention Problems. On each syndrome, T scores above 70 are considered to be in the clinical range and T scores from 67-70 in the borderline clinical range. Further, a total problem score, as well as, externalizing and internalizing scores are calculated. The cut-off for the clinical range for these scores is T = 60; however, scores in the T = 60-63 are considered in the borderline clinical range.

In regard to reliability, the test-retest reliability for the problem scales was \( r = .89 \) and for the competency scales \( r = .87 \) over a seven day period (Achenbach, 1991). Interparent agreement was found to be good as indicated by mean rs for competence scales ranging from .74 to .76. Further, mean rs for the problem scales ranged from .65 to .75. (Achenbach, 1991). Achenbach (1991) noted the following in respect to validity for the CBCL. The finding that nearly all of the CBCL items were able to discriminate significantly between demographically matched referred and nonreferred children.
supported content validity. Construct validity was supported by a number of correlates of the CBCL scales with analogous scales on other measures, such as the Conners Parent Questionnaire (1973, cited in Achenbach, 1991) and the Quay-Peterson Revised Behavior Problem Checklist (1983, cited in Achenbach, 1991). Criterion-related validity was also supported, as well as, validity for the clinical cut-points on the scale scores (Achenbach, 1991).

3.2.2.2 Post-Hoc CBCL-PTSD Scales

Recently two post-hoc CBCL-PTSD scales have been suggested. Firstly, using the DSM-III-R (APA, 1987) as a guide, Wolfe, Gentile, and Wolfe (1989) selected 20 items from the CBCL to form a PTSD scale (noted below as: CBCL-PTSD-W). The 20 items were: argues a lot (3); difficulty concentrating (8); obsessive thoughts (9); clings to adults (11); irrational fears (29); feels persecuted (34); nervous/tense (45); nightmares (47); too fearful or anxious (50); feels too guilty (52); secretive (69); irritable (86); moody (87); difficulty sleeping (100); sad or depressed (103); withdrawn (111); and somatic complaints, including each of headaches (56b), nausea (56c), stomach-aches (56f), and vomiting (56g).

Wolfe et al. (1989) found an alpha value of .89 for this scale when used with a sample of 68 sexually abused children. Fletcher (2001), using the same scale with 30 school-aged children (10 of whom were seeking treatment following a traumatic event) found an alpha of .83. However, Ruggerio and McLeer (2000) researched the concurrent and discriminant validity of the CBCL-PTSD-W. They reported questionable concurrent validity for this scale and suggested poor discriminant validity when used between sexually abused children and non-sexually abused psychiatric outpatients. Nonetheless, Ruggerio and McLeer (2000) noted that a limitation of their research is that it may not generalise to children who have been exposed to different types of traumatic events other than sexual abuse, one example given being children involved in road accidents.

Secondly, Friedrich, Lengua, Trane, Fisher, Davies, Pithers, and Trentham (under review) proposed a PTSD scale (noted below as: CBCL-PTSD-F) derived from the CBCL. Friedrich et al. (under review) using expert ratings and confirmatory factor analysis developed a 16-item PTSD/Dissociation scale (CBCL-PTSD-F), a seven-item PTSD sub-
scale, and a three-item Dissociation sub-scale. This study will utilise two of Friedrich et al.'s (under review) scales: the CBCL-PTSD-F and the PTSD sub-scale. The 16 items on CBCL-PTSD-F consisted of: difficulty concentrating (8); obsessive thoughts (9); confused (13); lost in thoughts (17); irrational fears (29); hears things (40); nervous/tense (45); nightmares (47); too fearful or anxious (50); compulsions (66); sleeps little (76); stares (80); strange behaviour (84); moody (87); sleepwalks (92); and difficulty sleeping (100). The PTSD sub-scale, from the CBCL-PTSD-F, consisted of: obsessive thoughts (9); irrational fears (29); nervous/tense (45); nightmares (47); too fearful or anxious (50); sleeps little (76); and difficulty sleeping (100). The CBCL-PTSD-F was found to have an alpha of .85 and the PTSD sub-scale had an alpha of .74 (Friedrich et al., under review). Further, Friedrich (personal communication, November, 2001) reported that mean scores on the CBCL-PTSD-F, when used with a sample of 8-17 year-olds (n = 293), were significantly different between PTSD and non-PTSD groups.

Items on all of the above scales are scored as according to the CBCL problem items (Achenbach, 1991), i.e., 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). It should be noted at the outset that all of the CBCL-PTSD post-hoc scales discussed above are relatively new and require further research to determine their reliability and validity. Certainly, it appears they have been chiefly employed with samples of sexually abused young people. However, it appears that these scales have the ability to screen for and identify PTSD symptoms in the course of using the CBCL. Friedrich et al. (under review) stated that, "By utilizing parent report, the scales have promise to enhance the utility of the CBCL with sub-scales that are more trauma-specific, an important consideration" (p. 11). Of course, it is not being suggested that these sub-scales should be used in isolation in the detection of trauma symptom assessment, only, as an additional tool to aid in the identification of children and adolescents suffering from post-traumatic stress symptoms. Consequently, given that the CBCL is being used in this study, it appears logical to use the CBCL-PTSD sub-scales. Thus, this study will employ the CBCL-PTSD-W, the CBCL-PTSD-F, and the PTSD sub-scale of the CBCL-PTSD-F.

3.2.2.3 Parent Report of the Child's Reaction to Stress (Fletcher, 1991)

The Parent Report of the Child's Reaction to Stress (Parent Report) was designed as a parent's pencil-and-paper report on a child's responses to a traumatic experience(s). The

The Parent Report also generates a total PTSD severity score, and allows associated symptoms (anxiety, sadness, omen formation, survivor guilt, self-guilt/blame, fantasy denial, self-destructive behaviour, dissociative responses, antisocial behaviour, risk-taking behaviour, and changed eating habits) to be assessed (Fletcher, 1996c). Limited psychometric testing has been performed on this measure. Results indicate that internal consistency is good at .89. The Parent Report correlated well (.82) with the CBCL-PTSD scale (previously used by Wolfe et al., 1989). Fletcher (1996a) reported that the Parent Report is a valid measure of PTSD, however, psychometric properties are still being determined.

While Fletcher (1996a) provided a sample (n = 30) of traumatised and non-traumatised children (aged 7 to 14 yrs) who had their severity scores recorded, there are no 'norms' or cut-off points noting what a score indicates. However, Carlson (1997) pointed out that children in this sample who had been exposed to traumatic stressors had higher severity scores in contrast to those without a traumatic experience. Consequently, this study will employ this measure to primarily detect the presence of PTSD symptoms and the syndrome itself, rather than focusing on severity scores.

3.2.2.4 The Trauma Symptom Checklist for Children – Alternate Version (TSCC-A; Briere, 1996b)

The TSCC-A assesses traumatic symptomatology in children, aged 8 to 16 years (and it has been noted to be applicable to 17 year-olds; Briere, 1996b). It is a self-report measure of post-traumatic distress and related symptomatology that consists of 44 items (Briere, 1996a; 1996b). These items generate two validity scales (Underresponse and Hyperresponse) and five clinical scales (Anxiety, Depression, Anger, Posttraumatic Stress, and Dissociation [with two sub-scales]). Normed on a large nonclinical, United States, sample (n = 3,008), this instrument provides cut-off clinical and subclinical $T$ scores for the above scales. A $T$ score of 65 or above is considered clinically significant, whereas, a $T$ score between 60 and 65 is considered suggestive of difficulty and might represent subclinical distress (Briere, 1996b).
A number of studies (Briere, 1996a) have reported that the TSCC (the measure the TSCC-A is derived from, which includes 10 more items that generate a Sexual Concerns scale) is reliable (alphas for all scales in the mid to high .80s) and, further, has convergent and predictive validity in nontraumatised and traumatised samples. Carlson (1997) noted that the TSCC Posttraumatic scale is strongly related to the intrusive thoughts scale of the Child Impact of Events Scale-Revised. In addition, Carlson (1997) reported that the construct validity of the TSCC is further supported by findings that demonstrate a relationship between elevated scores on the TSCC clinical scales and exposure to traumatic events.

3.2.2.5 Dimensions of Stressful Events (DOSE) Rating Scale (Fletcher, 1996b)
This scale contains a 25-item checklist that contributes to a comprehensive description of stressful events. Its items are based on dimensions of stressful events that are believed to increase the traumatic event’s effect on children. For example, unexpectedness of event, who or what was the source of the trauma, and so forth.

The interviewer, incorporating information gathered by the child and/or parent(s), evaluates the items. Fletcher (1996b) noted that this measure is intended to assess the equivalence of children’s experiences of the same or different stressors. Further, he reported that this is not a “true scale” and can be scored in a number of ways. Psychometric properties are currently unknown. However, the researcher believed that this scale gathered valuable information about the traumatic event that may otherwise have not be revealed (e.g., how prepared the child was for the event; did the event lead to religious or moral conflicts for them).

3.2.3 Interview

3.2.3.1 The Children’s PTSD Inventory (CPTSDI: Saigh, 1998)
The CPTSDI is a structured clinical interview that contains five subtests, 47 questions, based on the DSM-IV (APA, 1994) criteria for PTSD. The first subtest detects exposure to traumatic events as well as ascertaining reactivity (Yasik et al., in press). The second subtest establishes the presence or absence of reexperiencing symptoms. The third subtest ascertains presence or absence of avoidance and numbing symptoms. The fourth subtest
enquires about increased arousal symptoms. Lastly, the fifth subtest determines presence or absence of significant distress (Yasik et al., in press). The instrument generates the following diagnoses: PTSD Negative, Acute PTSD (duration of symptoms is less than 3 months), Chronic PTSD (duration of symptoms is longer than 3 months), Delayed Onset PTSD (if symptom onset was at least 6 months after the stressor), and No Diagnosis (used when examinee has been exposed to an extreme form of stress but does not acknowledge it).

Conventionally, this interview is stopped if the participant does not meet the criteria for PTSD. For example, if during the second subtest the child does not meet the criteria for reexperiencing, the interview would terminate. However, the researcher believed in this study that it would be beneficial to administer the whole interview regardless of final diagnosis in order to gain information on a number of key issues (e.g., sleep difficulties, avoidance). Personal communication with Philip Saigh, the author, gained approval for this approach.

According to Saigh et al. (2000), the CPTSDI has been noted to have acceptable psychometric properties. Saigh et al. (2000) reported the following concerning the CPTSDI's psychometric properties. Moderate to high Cronbach alphas (.53-.89) were noted at the subtest level, with an alpha of .95 at the diagnostic level. In regard to inter-rater reliability, 98.1% agreement was reported at the diagnostic level. In reference to test-retest reliability, 97.6% agreement was noted at the diagnostic level. Concerning validity, the CPTSDI has been reported to clearly exhibit empirical support for concurrent, convergent, and discriminant validity (Yasik et al., in press).

3.2.3.2 Additional Interview Questions

Eleven additional questions were added to the interview session by the researcher in order to address a number of issues (see Appendix P). These questions included current ratings of anxiety during road use, nature of physical injuries if acquired during the RTA, and

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2 Copies of the instruments used in this study are available from the original author(s). Copies of the researcher's own questionnaires and/or other materials (e.g., Consent Forms, Instruction Sheets, etc.) are available from the researcher: Lee Dymand, Department of Psychology, University of Canterbury, Private Bag 4800, Christchurch, New Zealand.
psychological history of the child and their family. These questions were adapted from the Cycling Accident Interview (CAI) used by the researcher in a previous study. The CAI originated from the Motor Vehicle Accident (MVA) Interview and was adapted with permission of the authors (Blanchard & Hickling, 1997). The MVA Interview (Blanchard & Hickling, 1997) was developed to assess aspects of a MVA, including subjective reactions to the MVA, physical injuries and medical interventions, and the impact of the MVA on travel behaviour following the accident.

As noted above, the nature of physical injuries, if acquired, was documented in this part of the interview. The rating scale was sourced from the CAI for the purpose of recording the level of physical injury sustained and time required in hospital for the interviewed participants. The scale denoted the following: "Very minor" = no medical attention; "Minor" = requires first aid; "Moderate" = visit to a medical centre; and "Severe" = hospital admission or attention (i.e., for broken bones or day surgery).

3.2.4 Other Diagnoses

While both the Parent Report and the CPTSDI are intended to be used to diagnose the presence or absence of PTSD, the researcher used the information gathered by these measures (i.e., identified symptoms) to detect the presence or absence of subsyndromal PTSD. The criteria for subsyndromal PTSD, used in this study, are defined by Blanchard and Hickling (1997) thus: "...what we termed subsyndromal PTSD -positive for Criterion B (reexperiencing symptoms) and either Criterion C (avoidance and psychic numbing) or Criterion D (hyperarousal), but not both..." (Blanchard & Hickling, 1997, p.38).

Further, the information gathered from the participants and their caregivers was used to determine the presence of other diagnoses in addition to PTSD. The other diagnoses of relevance are Accident Phobia (Kuch et al., 1991; Kuch et al., 1995) and DSM-IV Adjustment Disorder (APA, 1994). Accident Phobia is defined as meeting DSM-III or DSM-III-R diagnostic criteria for Simple Phobia (named Specific Phobia in DSM-IV; APA, 1994). The diagnostic criteria for Specific Phobia are detailed in Table 26. In addition, Accident Phobia requires that the phobia’s onset and content is associated with the accident, and, lastly, that avoidance behaviour and anxiety symptoms centre around...
disproportionate fears of repetition of the accident (Taylor & Koch, 1995). The other
diagnosis of importance, Adjustment Disorder (APA, 1994), is outlined in Table 27.

Table 26. DSM-IV Criteria for Specific Phobia

<table>
<thead>
<tr>
<th>Criterion A</th>
<th>Marked and persistent fear that is unreasonable or excessive, triggered by the presence or anticipation of a specific situation or object (e.g., cars, roads)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion B</td>
<td>Exposure to the phobic stimulus virtually always provokes an immediate anxiety response that may be in the form of a situationally bound or situationally predisposed Panic Attack. In children, the anxiety may be expressed by clinging, freezing, tantrums, or crying.</td>
</tr>
<tr>
<td>Criterion C</td>
<td>Person recognises the fear is unreasonable or excessive. This does not have to be present in children.</td>
</tr>
<tr>
<td>Criterion D</td>
<td>The phobic situation(s) is avoided or else is tolerated with distress or intense anxiety.</td>
</tr>
<tr>
<td>Criterion E</td>
<td>The avoidance, anxious anticipation, or distress in the phobic situation(s) interferes with the person's normal routine, academic or occupational functioning, relationships or social activities, or there is evident distress about having the phobia.</td>
</tr>
<tr>
<td>Criterion F</td>
<td>In individuals under age 18 years, the duration is at least 6 months.</td>
</tr>
<tr>
<td>Criterion G</td>
<td>The anxiety, Panic Attacks, or phobic avoidance are not better explained by another mental disorder.</td>
</tr>
</tbody>
</table>

Note, Specific Phobia can be further specified as: Animal Type, Natural Environment Type, Blood-Injection-Injury Type, Situational Type, and Other Type.

Adapted from DSM-IV (APA, 1994).
Criterion A
The development of behavioural or emotional symptoms in reaction to an identifiable stressor(s) taking place within 3 months of the onset of the stressor(s).

Criterion B
Symptoms or behaviour are clinically significant as evidenced by either of:
1) marked distress that is in excess of what would be expected from exposure to the stressor
2) significant impairment in occupational, academic, or social functioning

Criterion C
Stress-related disturbance is not better accounted for by another DSM-IV Axis I disorder or is not simply an exacerbation of a preexisting Axis I or Axis II disorder.

Criterion D
The symptoms do not signify Bereavement.

Criterion E
Once the stressor, or its consequences, has ended, the symptoms do not continue for longer than an additional 6 months.

Note, Adjustment Disorder can be further specified as: Acute (lasts less than 6 months) or Chronic (longer than 6 months when due to a chronic stressor or enduring consequences). Further, Adjustment Disorder can be coded by subtype: With Depressed Mood, With Anxiety, With Anxiety & Depressed Mood, With Disturbance of Conduct, With Mixed Disturbance of Emotions & Conduct, and Unspecified.

Adapted from DSM-IV (APA, 1994).
3.3 PROCEDURE

3.3.1 Initial Response

Participants, generally the parent or caregiver, responded to the newspaper articles and advertisements by calling and leaving a message at a designated toll free (0800) telephone number. Following this, the researcher contacted the participants within a few days by telephone. At this time, the researcher conveyed a brief synopsis of the research project and requested permission to mail out an Information Sheet and the two parent/caregiver-report questionnaires (CBCL & Parent Report). If consent was gained during this call then an interview time was scheduled. Otherwise, the participants were telephoned once they had received the Information Sheet to discuss if they would like to take part, and, if so, a time was set up to meet.

The package mailed out to the participants contained a number of forms. Firstly, an Instruction Sheet was included that outlined the forms included in the package and directions for the questionnaires enclosed (see Appendix Q). Secondly, an Information Sheet was enclosed giving details about the researcher, the research project, confidentiality, and so forth (see Appendix R). Further, a number of consent forms were included depending on the child’s age. There were three types of consent forms used in this study: the Parent/Caregiver Consent Form (see Appendix S), the Child/Adolescent Consent Form (for 10 years old and above) (see Appendix T), and the Adolescent Consent Form (for 15 years and above) (see Appendix U). Lastly, as noted, two questionnaires were sent out to be completed. These were the CBCL (Achenbach, 1991) and the Parent Report (Fletcher, 1991), both described above.

3.3.2 Interview

Due to participants being recruited from around New Zealand, it was not possible for them to travel to the researcher. Thus, the researcher travelled to the homes of the participants to conduct the interviews. The child’s parent(s) or caregiver(s) was invited to be present during the interview. Parents were present at all but two of the interviews (participants 9 & 10).
Upon arrival, the interviewer, a post-graduate, third year Clinical Psychology student, administered the TSCC-A (Briere, 1996b) to the child. In addition, he collected the completed questionnaires from the parent/caregiver, as well as, the signed consent forms. Following this, the CPTSDI (Saigh, 1998) was carried out. Following administration of the CPTSDI (Saigh, 1998), the Additional Questions Form was completed. Further, any unanswered items on the DOSE (Fletcher, 1996b) were addressed. The time taken for each interview ranged from 40 minutes to 80 minutes, but generally most interviews took one hour to complete. The interview length was determined by the amount of communication needed to adequately address each question or issue discussed.

3.3.3. Debrief

After completing the interview, the researcher then scored and evaluated the information gathered from the participants. If there were no signs of concern the family was sent a thank you letter, which emphasised that if there were any concerns about the child’s mental health in the future then these should be addressed with their GP or local mental health service. In contrast, if there were any areas of concern noted in the child, the researcher outlined these in a letter to the parents of the participant. Each letter varied depending on the type of symptom presentation. Nonetheless, the family was encouraged to seek advice from their GP or a local mental health service if they felt concerned about their child’s mental health. Further, the researcher offered to write a letter communicating assessment information to the participant’s GP or counsellor if the family requested it.
3.4 RESULTS

3.4.1 Descriptive Information

3.4.1.1 Age & Gender
The range of ages in this study was eight years through to 17 years. The mean age of those interviewed (n = 16) was 12 years and 3 months. The mean age of all those who participated (n = 19), including the three not interviewed, was 12 years and 8 months. Of those interviewed (n = 16), five participants were female and eleven were male. The three participants not interviewed were male.

3.4.1.2 Ethnicity
Participants had the following ethnic origins. The 16 participants interviewed reported the following: ten (63%) identified themselves as New Zealand-European, three (19%) identified themselves as mixed Maori and New Zealand-European ethnicity, two (13%) identified themselves as Maori, and one (6%) identified himself as mixed Maori and Scottish ethnicity.

The three participants not interviewed reported the following ethnic origins. Two identified themselves as New Zealand-European and the other identified himself as mixed New Zealand-European and Maori. Thus, incorporating these participants with the 16 participants interviewed generated the following percentages. Sixty-three percent (n = 12) were of New Zealand-European descent, 21% (n = 4) were of mixed Maori and New Zealand-European descent, 11% (n = 2) were of Maori descent, and 5% (n = 1) were of mixed Maori and Scottish descent.

3.4.1.3 Accident Type & Injury Severity
The following accident types were noted from the 16 interviewed participants: nine (56%) were passengers in a vehicle that crashed, five (31%) were cyclists, one (6%) was a pedestrian, and one (6%) crashed while on his scooter. Incorporating the three participants who were not interviewed generated the following: nine (47%) were passengers in a vehicle that crashed, five (26%) were cyclists, two (11%) were
pedestrians, one (5%) crashed while on his scooter, one (5%) was a driver of a car, and one (5%) witnessed a road crash in which his father was killed.

Injury severity ratings of the 16 interviewed participants entailed the following. Two (13%) participants noted very minor injuries. One (6%) participant reported minor injuries. Seven (44%) participants recounted moderate injuries, and six (38%) participants noted severe injuries.

3.4.1.4 Time from the Accident to the Interview
The range of time from the accident to the interview ranged from two months to 24 months for all participants, including those not interviewed. The mean for those interviewed (n = 16) was 6.9 months. The mean for all participants (n = 19) was 7.1 months.

3.4.1.5 Previous Psychological Difficulties
Parents of the 16 participants interviewed were queried if there had been any psychological disorders or difficulties present in their child before the accident. The following was noted: three (19%) had been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), one (6%) had a childhood history of depression, and one (6%) had a childhood history of anxiousness.

3.4.2 Questionnaires/Measures

3.4.2.1 Child Behavior Checklist for Ages 4-18 (Achenbach, 1991)
The incidence of mental health difficulties, which was determined by a total problem T score of 60 or above on the CBCL, was 56% (9/16) in the interviewed participants and 53% (10/19) in the whole sample. In contrast, in Achenbach’s (1991) sample of nonreferred children the prevalence was 18%. Tables 28 & 29 display the participants’ scores on the CBCL Competence and Syndrome scales, as well as Total Problem, Internalizing, and Externalizing T scores.
Table 28. **Competence & Total Competence T scores on the CBCL/4-18**

<table>
<thead>
<tr>
<th>ID #</th>
<th>Activities</th>
<th>Social</th>
<th>School</th>
<th>Total Competence Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
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<td>55</td>
<td>39</td>
<td>46</td>
</tr>
<tr>
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<td>53</td>
<td>30+</td>
<td>51</td>
<td>41</td>
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<tr>
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<td>55</td>
<td>55</td>
<td>47</td>
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<td>39+</td>
</tr>
<tr>
<td>8</td>
<td>53</td>
<td>55</td>
<td>53</td>
<td>67</td>
</tr>
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<td>9</td>
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<td>37</td>
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<tr>
<td>19</td>
<td>40</td>
<td>*</td>
<td>55</td>
<td>*</td>
</tr>
</tbody>
</table>

*Note:*  
+ T score falls into the Borderline Clinical Range.  
++ T score falls into the Clinical Range.  
* Score not computed due to missing data.
Table 29. Syndrome, Internalizing, Externalizing, & Total Problem T scores on the CBCL/4-18

<table>
<thead>
<tr>
<th>ID #</th>
<th>Withdrawn</th>
<th>Somatic Complaints</th>
<th>Anxious/Social Problems</th>
<th>Thought Problems</th>
<th>Attention Problems</th>
<th>Delinquent Behavior</th>
<th>Aggressive Behavior</th>
<th>Internal.</th>
<th>External.</th>
<th>Total Problem Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>56</td>
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<td>4</td>
<td>65</td>
<td>70+</td>
<td>72++</td>
<td>66</td>
<td>67+</td>
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<td>71++</td>
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<td>75++</td>
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<td>60</td>
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<td>80++</td>
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<td>75++</td>
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<td>70+</td>
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<td>50</td>
<td>71++</td>
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<td>70+</td>
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<td>61+</td>
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<tr>
<td>17</td>
<td>85++</td>
<td>72++</td>
<td>94++</td>
<td>63</td>
<td>76++</td>
<td>75++</td>
<td>69+</td>
<td>63</td>
<td>89++</td>
<td>67++</td>
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<td>18</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>61</td>
<td>61</td>
<td>56</td>
<td>57</td>
<td>57</td>
</tr>
</tbody>
</table>

Note: + T score falls into the Borderline Clinical Range.
++ T score falls into the Clinical Range.
3.4.2.2 Post-Hoc CBCL-PTSD Scales

Table 30, below, details participants’ scores on the three post-hoc CBCL-PTSD scales. That is, the CBCL-PTSD-W (Wolfe et al., 1989), the CBCL-PTSD-F (Friedrich et al., under review), and the PTSD sub-scale of the CBCL-PTSD-F (Friedrich et al., under review). Items on these scales are scored as 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). The scores presented below are the total scores for each participant on each scale.

Table 30. Participant Scores on the CBCL-PTSD-W, the CBCL-PTSD-F, & the PTSD sub-scale of the CBCL-PTSD-F

<table>
<thead>
<tr>
<th>ID #</th>
<th>CBCL-PTSD-W</th>
<th>CBCL-PTSD-F</th>
<th>PTSD sub-scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>8</td>
<td>3</td>
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<tr>
<td>7</td>
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<td>5</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>12</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>22</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>32</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 31, below, compares the means and standard deviations of the total CBCL-PTSD-W scales scores in the present sample with three samples from Ruggiero and McLeer (2000). The samples from Ruggiero and McLeer consisted of the following. Firstly, a sample of 63 sexually abused children and adolescents aged between 6 – 16 years. Secondly, a sample of 60 psychiatric outpatient children and adolescents (6 – 16 years), excluding those with abuse histories. The third sample was 61 school children and adolescents (6 – 16 years), again excluding those with abuse histories. A t-test was conducted to compare the Sexually Abused, Psychiatric Outpatient, and School samples’ total CBCL-PTSD-W means and standard deviations (Ruggiero & McLeer, 2000) with the current findings. This revealed no significant differences (p > 0.05) between the current study’s road accident sample and the Sexually Abused group or with the Psychiatric Outpatient group. However, a significant difference (p < 0.05) was found between the current Road Accident group and the School sample. That is, the mean scores for the current study were significantly higher than in the School sample.


<table>
<thead>
<tr>
<th></th>
<th>Sexually Abused (n = 63)</th>
<th>Psychiatric Outpatient (n = 60)</th>
<th>School (n = 61)</th>
<th>Current Study Road Accident (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBCL-PTSD-W score</td>
<td>Mean 9.33 SD 6.30</td>
<td>Mean 10.52 SD 6.20</td>
<td>Mean 4.90 SD 4.50</td>
<td>Mean 9.68 SD 8.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 32, over, presents CBCL-PTSD-W item means and standard deviations for participants in the current study. Further, item means and standard deviations for three samples researched by Wolfe and Birt (1997) are presented for comparison. The samples presented by Wolfe and Birt (1997) were as follows. Firstly, a sample of 350 sexually abused children and adolescents. Secondly, a sample of 209 nonabused clinic-referred children and adolescents. The third group was the pre-1991 CBCL standardization sample (n = 1,431). Fifteen of the items of the CBCL-PTSD-W, as rated in the road accident sample, were found to be significantly higher (p < 0.05) than the item means of the Standardization sample.
<table>
<thead>
<tr>
<th>Items</th>
<th>1. Sexually Abused (n = 350)</th>
<th>2. Clinic-Referred (n = 209)</th>
<th>3. Standardization (n = 1434)</th>
<th>4. Current Study Road Accident (n = 19)</th>
<th>Group Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Agues a lot</td>
<td>1.23 (.70)</td>
<td>.24 (.55)</td>
<td>.78 (.71)</td>
<td>1.16 (.76)*</td>
<td>1 &gt; 4 &gt; 3 &gt; 2</td>
</tr>
<tr>
<td>8. Can’t concentrate</td>
<td>.93 (.77)</td>
<td>.33 (.64)</td>
<td>.37 (.57)</td>
<td>1.00 (.88)*</td>
<td>4 &gt; 1 &gt; 3 &gt; 2</td>
</tr>
<tr>
<td>9. Obsessive thoughts</td>
<td>.62 (.75)</td>
<td>.24 (.49)</td>
<td>.36 (.63)</td>
<td>.37 (.68)</td>
<td>1 &gt; 4 &gt; 3 &gt; 2</td>
</tr>
<tr>
<td>11. Clings to adults</td>
<td>.72 (.76)</td>
<td>.29 (.57)</td>
<td>.18 (.46)</td>
<td>.32 (.58)</td>
<td>1 &gt; 4 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>29. Fear certain animals, situations, or places</td>
<td>.52 (.73)</td>
<td>.12 (.41)</td>
<td>.28 (.51)</td>
<td>.37 (.68)</td>
<td>1 &gt; 4 &gt; 3 &gt; 2</td>
</tr>
<tr>
<td>34. Feels persecuted</td>
<td>.52 (.68)</td>
<td>.58 (.71)</td>
<td>.09 (.31)</td>
<td>.37 (.60)*</td>
<td>2 &gt; 1 &gt; 4 &gt; 3</td>
</tr>
<tr>
<td>45. Nervous, high-strung</td>
<td>.79 (.74)</td>
<td>.53 (.71)</td>
<td>.27 (.52)</td>
<td>.68 (.82)*</td>
<td>1 &gt; 4 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>47. Nightmares</td>
<td>.62 (.67)</td>
<td>.61 (.71)</td>
<td>.17 (.39)</td>
<td>.42 (.61)*</td>
<td>1 &amp; 2 &gt; 4 &gt; 3</td>
</tr>
<tr>
<td>50. Fearful/anxious</td>
<td>.47 (.65)</td>
<td>.23 (.50)</td>
<td>.14 (.38)</td>
<td>.32 (.58)*</td>
<td>1 &gt; 4 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>52. Feels too guilty</td>
<td>.44 (.65)</td>
<td>.44 (.66)</td>
<td>.06 (.25)</td>
<td>.32 (.58)*</td>
<td>1 &amp; 2 &gt; 4 &gt; 3</td>
</tr>
<tr>
<td>56b. Headaches</td>
<td>.55 (.69)</td>
<td>.40 (.63)</td>
<td>.17 (.42)</td>
<td>.21 (.54)</td>
<td>1 &gt; 2 &gt; 4 &gt; 3</td>
</tr>
<tr>
<td>56c. Nausea</td>
<td>.39 (.63)</td>
<td>.13 (.38)</td>
<td>.05 (.42)</td>
<td>.21 (.42)*</td>
<td>1 &gt; 4 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>56f. Stomach-aches</td>
<td>.56 (.69)</td>
<td>.20 (.49)</td>
<td>.10 (.32)</td>
<td>.21 (.42)</td>
<td>1 &gt; 4 &amp; 2 &gt; 3</td>
</tr>
<tr>
<td>56g. Vomiting</td>
<td>.13 (.40)</td>
<td>.67 (.80)</td>
<td>.02 (.16)</td>
<td>.11 (.32)*</td>
<td>2 &gt; 1 &amp; 4 &gt; 3</td>
</tr>
<tr>
<td>69. Secretive</td>
<td>.89 (.32)</td>
<td>.27 (.76)</td>
<td>.43 (.14)</td>
<td>.53 (.77)*</td>
<td>1 &gt; 4 &gt; 3 &gt; 2</td>
</tr>
<tr>
<td>86. Irritable</td>
<td>.99 (.71)</td>
<td>.89 (.78)</td>
<td>.23 (.46)</td>
<td>1.05 (.78)*</td>
<td>4 &gt; 1 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>87. Moody</td>
<td>.88 (.74)</td>
<td>.69 (.78)</td>
<td>.23 (.46)</td>
<td>.74 (.81)*</td>
<td>1 &gt; 4 &gt; 2 &gt; 3</td>
</tr>
<tr>
<td>100. Trouble Sleeping</td>
<td>.44 (.66)</td>
<td>.85 (.78)</td>
<td>.08 (.29)</td>
<td>.47 (.84)*</td>
<td>2 &gt; 4 &gt; 1 &gt; 3</td>
</tr>
<tr>
<td>103. Sad, depressed</td>
<td>.72 (.67)</td>
<td>.73 (.79)</td>
<td>.10 (.31)</td>
<td>.47 (.70)*</td>
<td>2 &amp; 1 &gt; 4 &gt; 3</td>
</tr>
<tr>
<td>111. Withdrawn</td>
<td>.41 (.62)</td>
<td>.61 (.79)</td>
<td>.06 (.25)</td>
<td>.37 (.68)*</td>
<td>2 &gt; 1 &gt; 4 &gt; 3</td>
</tr>
</tbody>
</table>

Table adapted from Wolfe & Birt (1997)
* Indicates scores were significantly higher (p < 0.05) than the Standardization group scores.
Table 33, below, compares the means and standard deviations of the total CBCL-PTSD-F scales scores in the present sample with three samples from Friedrich et al. (under review). Further, table 34, over, compares the means and standard deviations of the total PTSD sub-scale (of the CBCL-PTSD-F) scores in this sample with the same three samples from Friedrich et al. (under review). The samples from Friedrich et al. consisted of the following. Firstly, a sample of 409 sexually abused children aged between 4 – 12 years. Secondly, a sample of 431 psychiatric outpatient children (4 – 12 years), excluding those with known abuse histories. The third sample, a normative sample, consisted of 629 school children (4 – 12 years), again excluding those with known abuse histories.

A t-test was conducted to compare the Sexually Abused, Psychiatric Outpatient, and Normative School children samples’ total CBCL-PTSD-F means (Friedrich et al., under review) with the current findings. This revealed no significant differences (p > 0.05) between the means of the Road Accident sample and the Sexually Abused group or with the Psychiatric Outpatient group. However, the Road Accident group mean was significantly higher than the School sample mean.

Table 33. Means & Standard Deviations of CBCL-PTSD-F in Current Study
Compared with Samples of Friedrich et al. (under review)

<table>
<thead>
<tr>
<th></th>
<th>Sexually Abused (n = 409)</th>
<th>Psychiatric Outpatient (n = 431)</th>
<th>Normative (School) (n = 629)</th>
<th>Current Study Road Accident (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>CBCL-PTSD-F score</td>
<td>7.7</td>
<td>6.0</td>
<td>8.4</td>
<td>5.9</td>
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</tbody>
</table>
A t-test was conducted to compare the Sexually Abused, Psychiatric Outpatient, and Normative School children samples means for the total PTSD sub-scale (of the CBCL-PTSD-F) (Friedrich et al., under review) with the current study mean scores on the same variables. Mean scores for the Road Accident sample were not significantly different from that of the Sexually Abused group or the Psychiatric Outpatient group, however, a significant difference ($p < 0.05$) was found between the Road Accident mean score (2.8) and the Normative School mean (1.5).

Table 34. **Means & Standard Deviations of PTSD sub-scale (CBCL-PTSD-F) in Current Study Compared with Samples of Friedrich et al. (under review)**

<table>
<thead>
<tr>
<th></th>
<th>Sexually Abused (n = 409)</th>
<th>Psychiatric Outpatient (n = 431)</th>
<th>Normative (School) (n = 629)</th>
<th>Current Study Road Accident (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD sub-scale (CBCL-PTSD-F) score</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>3.8</td>
<td>3.2</td>
<td>3.7</td>
<td>3.2</td>
</tr>
</tbody>
</table>

3.4.2.3 **Parent Report of the Child’s reaction to Stress** *(Fletcher, 1991)*

Table 35, over, details the prevalence of PTSD symptoms as noted by parents on the Parent Report for the 19 participants. Highest occurring symptoms noted in the sample were: intrusive recollections, 68%; physical reaction to reminders, 53%; increased irritability and anger since the RTA, 53%; hypervigilance, 42%; and distress at reminders, 47%. The table shows the number of cases that received a PTSD diagnosis (21%) and a subsyndromal PTSD diagnosis (16%). Overall, seven (37%) participants received a PTSD spectrum diagnosis.
### Table 35. Prevalence of PTSD Symptoms Noted on the Parent Report

<table>
<thead>
<tr>
<th>PARTICIPANT</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>7</th>
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<th>9</th>
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<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>18</th>
<th>19</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYMPTOM</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Resperiencing Symptoms</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Intrusive recollection</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>68%</td>
</tr>
<tr>
<td>2. Recurrent distressing dreams</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>37%</td>
</tr>
<tr>
<td>3. Flashbacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>4. Distress at reminders</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
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<td>X</td>
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<td>X</td>
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<td>X</td>
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</tr>
<tr>
<td>Avoidance &amp; Numbing Symptoms</td>
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<tr>
<td>7. Behavioural avoidance</td>
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</tr>
<tr>
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</tr>
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<td>9. Loss of interest/anhedonia</td>
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</tr>
<tr>
<td>10. Estrangement</td>
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<td>X</td>
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<td>21%</td>
</tr>
<tr>
<td>11. Emotional numbing</td>
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<td>13. Sleep Disturbance</td>
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<td>37%</td>
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<tr>
<td>14. Irritability/anger</td>
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</tr>
<tr>
<td>15. Difficulty concentrating</td>
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<td>21%</td>
</tr>
<tr>
<td>16. Hypervigilance</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<td>X</td>
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</tr>
<tr>
<td>17. Exaggerated startle</td>
<td>X</td>
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<td>X</td>
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<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>21%</td>
</tr>
</tbody>
</table>

**Note:**
- [ ] Meets criteria for PTSD
- [ ] Meets criteria for subsyndromal PTSD

- **PTSD undetermined as Criterion F (clinically significant distress) not able to be ascertained without communicating with the participant (18). However, he meets all other PTSD criteria.
3.4.2.4 Trauma Symptom Checklist for Children – Alternate Version (Briere, 1996b)

Table 36 presents the T scores for participants on the TSCC-A. Seven profiles were invalid, six due to underresponse and one was invalid due to multiple responses. Of the nine profiles that were interpretable, the following was noted. Participant 3 was in the subclinical range for Posttraumatic Stress. Briere (1996b) noted that a significant score on this scale reflects that the child may be experiencing classic post-traumatic stress symptoms such as, “intrusive thoughts, sensations, and memories of painful past events; nightmares...and cognitive avoidance of negative thoughts and memories” (p. 13). Further, Briere (1996b) reported that these symptoms can interfere in normal daily functioning, which may lead to anxious distractibility or irritability. Participant 5 was the only other participant with a significant T score. She received a subclinical T score on Overt Dissociation. Briere (1996b) reported that, “children with clinically significant elevations on the DIS [Dissociation] scale (especially on DIS-O [Overt Dissociation]) often present with reduced responsivity to the external environment, emotional detachment, and a tendency to cognitively avoid negative affect” (p.13).
Table 36. Trauma Symptom Checklist for Children – Alternate Version

<table>
<thead>
<tr>
<th>ID #</th>
<th>Underresponse</th>
<th>Hyperresponse</th>
<th>Anxiety</th>
<th>Depression</th>
<th>Anger</th>
<th>Posttraumatic Stress</th>
<th>Dissociation</th>
<th>Overt Dissociation</th>
<th>Fantasy</th>
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<tr>
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<td>86*</td>
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<tr>
<td>3+</td>
<td>46</td>
<td>47</td>
<td>51</td>
<td>51</td>
<td>40</td>
<td>64++</td>
<td>56</td>
<td>56</td>
<td>54</td>
</tr>
<tr>
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<td>76*</td>
<td></td>
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<td>46</td>
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<td>55</td>
<td>58</td>
<td>61++</td>
<td>47</td>
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<tr>
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<td>81*</td>
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<td>7</td>
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<tr>
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<td>16</td>
<td>57</td>
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<td>37</td>
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<td>53</td>
<td>36</td>
<td>41</td>
<td>40</td>
<td>47</td>
</tr>
</tbody>
</table>

Note: * TSCC-A considered invalid due to Underresponse.
** TSCC-A considered invalid due to multiple responses.
+ Note, this participant is 17 years of age; thus, out of the set population age. However, Briere (1996b) noted that the TSCC-A may be appropriate for use with 17 year-olds if interpreted with caution.
++ These T scores fall into the subclinical range (i.e., suggestive of difficulty).
3.4.2.5 Children’s PTSD Inventory (Saigh, 1998)

Table 37, over, presents the prevalence of PTSD symptoms as reported by the 16 participants who were interviewed. The most frequently reported symptoms included avoidance of thoughts and feelings associated with the RTA (63%), event amnesia (56%), intrusive recollections (50%), distressing dreams (50%), and hypervigilance (44%). The table details those who received a PTSD diagnosis (19%) and those who were noted as having subsyndromal PTSD (31%). Overall, eight (50%) of the participants who were interviewed received a PTSD spectrum diagnosis.
Table 37. **Prevalence of PTSD Symptoms Noted on the Children's PTSD Inventory**

<table>
<thead>
<tr>
<th>PARTICIPANT</th>
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<th>2</th>
<th>4</th>
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<th>7</th>
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<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>Total</th>
</tr>
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<td>X X</td>
<td>X X</td>
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</tr>
<tr>
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<td>X X</td>
<td>X X</td>
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<td></td>
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<td></td>
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<td>X X</td>
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<td>50%</td>
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</tr>
<tr>
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<tr>
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<tr>
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<tr>
<td>5. Physical reaction to reminders</td>
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<tr>
<td><strong>Avoidance &amp; Numbing Symptoms</strong></td>
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</tr>
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<td>6. Avoid thoughts/feelings</td>
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<td>X X</td>
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<td></td>
<td>X X</td>
<td>X X</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>8. Event Amnesia</td>
<td>X X</td>
<td>X X</td>
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<td>X</td>
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<td>56%</td>
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</tr>
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<td>X X</td>
<td>X X</td>
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<td></td>
<td>X X</td>
<td>X X</td>
<td>13%</td>
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<td>X X</td>
<td>X X</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>11. Emotional numbing</td>
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<td>25%</td>
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</tr>
<tr>
<td>12. Foreshortened future</td>
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<td></td>
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<td>X X</td>
<td>25%</td>
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</tr>
<tr>
<td><strong>Hyperarousal Symptoms</strong></td>
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<td></td>
<td>X X</td>
<td>X X</td>
<td>31%</td>
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</tr>
<tr>
<td>13. Sleep Disturbance</td>
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<td>X</td>
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<td>X X</td>
<td>38%</td>
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</tr>
<tr>
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<tr>
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</tr>
</tbody>
</table>

**Note:**  ■ Meets criteria for PTSD  ■ Meets criteria for subsyndromal PTSD
3.4.3 Brief Participant Findings

Table 38 gives a brief summary of each participant who was involved in this study. The table presents their gender, age, race, and time since their RTA. It summaries their type of accident, reports their DOSE score, reports their CBCL profile, and notes their TSCC-A profile. Lastly, it notes their diagnoses on both the Parent Report and the interview (CPTSDI).

In addition to the diagnoses noted in the measures above and in table 38, the 16 interviewed participants were evaluated for Accident Phobia and Adjustment Disorder. Overall, the 16 interviewed participants generated the following findings. Based on the interview (CPTSDI), 19% (n = 3) of the participants met PTSD criteria and 31% (n = 5) met subsyndromal PTSD criteria. Moreover, of the 16 interviewed, 19% (n = 3), as mentioned, received a PTSD diagnosis, 44% (n = 7) received an Adjustment Disorder diagnosis, and 6% (n = 1) received an Accident Phobia (Specific Phobia) diagnosis. That is, 69% (n = 11) of the interviewed participants displayed sufficient significant psychological distress to warrant DSM-IV diagnosis. Each participant's symptom presentation and diagnosis, if assigned one, is detailed in the Case Reports section to follow (p.185).
Table 38. **Brief Participant Findings**

<table>
<thead>
<tr>
<th>ID #</th>
<th>GENDER</th>
<th>ROAD ACCIDENT TYPE</th>
<th>DOSE Score</th>
<th>CBCL Profile</th>
<th>TSCC-A Profile</th>
<th>PARENT REPORT (Diagnosis &amp; Severity Score)</th>
<th>CHILD INTERVIEW (Diagnosis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>On her bicycle, collided with car as it reversed out of a driveway. Suffered facial grazing and sprained ankle (2 hrs. hospital admission). - moderate injuries</td>
<td>17</td>
<td>Clinical Range: Nil</td>
<td>Nothing of significance</td>
<td>PTSD NEGATIVE 19</td>
<td>PTSD NEGATIVE</td>
</tr>
<tr>
<td></td>
<td>13 yrs</td>
<td></td>
<td></td>
<td>Borderline Clinical Range: Nil</td>
<td></td>
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<tr>
<td></td>
<td>NZ-Euro.</td>
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<td></td>
<td>5 months</td>
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<tr>
<td>2</td>
<td>Female</td>
<td>Came off her bicycle on a downhill road. Lost consciousness for 5 minutes, suffered gravel burns to facial area, stitches required (4 days hospitalisation). - severe injuries</td>
<td>17</td>
<td>Clinical Range: Nil</td>
<td>Invalid due to underresponse</td>
<td>PTSD NEGATIVE 18</td>
<td>PTSD NEGATIVE</td>
</tr>
<tr>
<td></td>
<td>11 yrs</td>
<td></td>
<td></td>
<td>Borderline Clinical Range: Nil</td>
<td></td>
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<tr>
<td></td>
<td>NZ-Euro.</td>
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<td></td>
<td>2 months</td>
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<tr>
<td>3</td>
<td>Male</td>
<td>Passenger in front seat when father fell asleep at the wheel leading to a collision with a powerpole. Suffered cheekbone damage, sprained lower back and wrist (4 days hospitalisation). Multiple injuries to father and two other passengers. - severe injuries</td>
<td>26</td>
<td>Clinical Range: Attention Problems</td>
<td>Posttraumatic Stress (sub-clinical range)*</td>
<td>PTSD NEGATIVE 70</td>
<td>CHRONIC PTSD</td>
</tr>
<tr>
<td></td>
<td>17 yrs</td>
<td></td>
<td></td>
<td>Borderline Clinical Range: Nil</td>
<td></td>
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<tr>
<td></td>
<td>NZ-Euro.</td>
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<tr>
<td></td>
<td>24 months</td>
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<tr>
<td>No.</td>
<td>Gender</td>
<td>Age</td>
<td>Ethnicity</td>
<td>Details of Accident</td>
<td>Clinical Range:</td>
<td>PTSD Status</td>
<td>Notes</td>
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<tr>
<td>4</td>
<td>Male</td>
<td>12 yrs</td>
<td>NZ-Euro.</td>
<td>On his bicycle, turned in front of an oncoming car. He was flipped into the air and landed on the opposite side of the road. Suffered a fractured pelvis, grazing and cuts. Saw GP on the day but needed hospital attention the following day for approximately 2 hours. - moderate injuries</td>
<td>Invalid due to underresponse</td>
<td>PTSD NEGATIVE</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>14 yrs</td>
<td>Maori/ NZ-Euro.</td>
<td>Passenger in rear seat when car collided with another vehicle. Leg bruising and cut to eyebrow (8 hrs hospitalisation). Mother incurred minor injuries. Father (driver) was killed in the accident. - moderate injuries</td>
<td>PTSD POSITIVE 67</td>
<td>ACUTE PTSD</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>8 yrs</td>
<td>Maori/ NZ-Euro.</td>
<td>Crossing road as a pedestrian and failed to effectively check for traffic. Hit by oncoming car, suffered bruising to his pelvis (5 hrs hospitalisation). - moderate injuries</td>
<td>PTSD POSITIVE 60</td>
<td>PTSD NEGATIVE</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>12 yrs</td>
<td>Maori/ Scottish</td>
<td>On his bicycle, turned in front of an oncoming car. Lost consciousness for 1 minute. He was flipped into the air, suffered a broken leg, and stitches to both legs. Required approximately 10 days hospitalisation. - severe injuries</td>
<td>PTSD NEGATIVE 14</td>
<td>PTSD NEGATIVE</td>
<td></td>
</tr>
</tbody>
</table>

Clinical Range:
- Anxious/Depressed Aggressive Behavior
- Borderline Clinical Range: Somatic Complaints Thought Problems Delinquent Behavior

Borderline Clinical Range:
- Borderline Clinical Range: Nil

Sub-clinical Range:
- Borderline Clinical Range: Nil

PTSD Status:
- PTSD NEGATIVE
- PTSD POSITIVE
- ACUTE PTSD
- PTSD NEGATIVE
<table>
<thead>
<tr>
<th>ID #</th>
<th>GENDER</th>
<th>ROAD ACCIDENT TYPE</th>
<th>DOSE Score</th>
<th>CBCL Profile</th>
<th>TSCC-A Profile</th>
<th>PARENT REPORT (Diagnosis &amp; Severity Score)</th>
<th>CHILD INTERVIEW (Diagnosis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Male</td>
<td>Came off his scooter on a skateboard ramp. Knocked out two front teeth and a piece of wood punctured and became lodged in his lip. Required a visit to a GP and a dentist.</td>
<td>18</td>
<td>Clinical Range: Nil Borderline Clinical Range: Nil</td>
<td>Invalid due to underresponse</td>
<td>PTSD NEGATIVE 13</td>
<td>PTSD NEGATIVE</td>
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<tr>
<td></td>
<td>10 yrs</td>
<td>NZ-Euro.</td>
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<td></td>
<td></td>
<td>3 months</td>
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<tr>
<td>9</td>
<td>Male</td>
<td>Passenger in rear seat when their car veered off the road and rolled. Thrown out of car, suffered broken hand, cuts, and grazing (2 days hospitalisation). Multiple injuries to father (driver) and brother (Participant # 10).</td>
<td>22</td>
<td>Clinical Range: Aggressive Behavior Borderline Clinical Range: Delinquent Behavior</td>
<td>Nothing of significance</td>
<td>PTSD NEGATIVE 14</td>
<td>PTSD NEGATIVE</td>
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<tr>
<td></td>
<td>11 yrs</td>
<td>Maori/ NZ-Euro.</td>
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<td></td>
<td></td>
<td>11 months</td>
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<tr>
<td>10</td>
<td>Male</td>
<td>Passenger in rear seat when their car veered off the road and rolled. Seated upside down when car halted. Suffered two fractured vertebrae and cuts to legs (7 days hospitalisation). Multiple injuries to father (driver) and brother (Participant # 9).</td>
<td>25</td>
<td>Clinical Range: Anxious/Depressed Borderline Clinical Range: Withdrawn Attention Problems</td>
<td>Nothing of significance</td>
<td>PTSD NEGATIVE 39</td>
<td>SUB-SYNDROMAL PTSD+</td>
</tr>
<tr>
<td></td>
<td>14 yrs</td>
<td>Maori</td>
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<tr>
<td></td>
<td>Gender</td>
<td>Age</td>
<td>Injuries</td>
<td>PTSD</td>
<td>Clinical Range</td>
<td>Borderline Clinical Range</td>
<td>Delinquent Behavior</td>
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<tr>
<td>11</td>
<td>Male</td>
<td>13</td>
<td>Male Passenger in rear seat when their car swerved and rolled twice. Suffered cut to head (2 hrs hospitalisation). Multiple injuries to father (driver), mother, and brother (Participant # 12).</td>
<td>PTSD NEGATIVE 15</td>
<td>Clinical Range: Nil</td>
<td>Borderline Clinical Range: Nil</td>
<td>Nothing of significance</td>
</tr>
<tr>
<td>13</td>
<td>Male</td>
<td>16 yrs</td>
<td>Male Passenger in rear seat when their car swerved rolled twice. Suffered facial cuts (needed surgery) and cuts to knees that required stitching (5 days hospitalisation). Multiple injuries to father (driver), mother, and brother (Participant # 11).</td>
<td>PTSD NEGATIVE 21</td>
<td>Clinical Range: Nil</td>
<td>Borderline Clinical Range: Delinquent Behavior</td>
<td>Aggressive Behavior</td>
</tr>
<tr>
<td>21</td>
<td>Female</td>
<td>9 yrs</td>
<td>Female Passenger in car with father (driver) when they collided with a truck and were pushed into a ditch. No injuries suffered.</td>
<td>PTSD NEGATIVE 77</td>
<td>Clinical Range: Nil</td>
<td>Borderline Clinical Range: Anxious/Depressed</td>
<td>Delinquent Behavior</td>
</tr>
<tr>
<td>28</td>
<td>Male</td>
<td>10 yrs</td>
<td>Male Passenger in car with father (driver) who fell asleep at the wheel, collided with another car. Received bang to chin and leg, required no hospitalisation. Multiple injuries to father and passengers in the other car.</td>
<td>PTSD NEGATIVE 52</td>
<td>Clinical Range: Nil</td>
<td>Borderline Clinical Range: Somatic Complaints</td>
<td>Anxious/Depressed</td>
</tr>
<tr>
<td>ID #</td>
<td>GENDER</td>
<td>ROAD ACCIDENT TYPE</td>
<td>DOSE Score</td>
<td>CBCL Profile</td>
<td>TSCC-A Profile</td>
<td>PARENT REPORT (Diagnosis &amp; Severity Score)</td>
<td>CHILD INTERVIEW (Diagnosis)</td>
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<tr>
<td>15</td>
<td>Male</td>
<td>Passenger in car which collided with another. No injuries aquired. Father (driver), mother, and brother received no major injuries. Minor injury to woman in other car (cut leg). In addition, this participant witnessed another car hit a power pole one-month prior.</td>
<td>24</td>
<td>Clinical Range: Withdrawn Anxious/Depressed Attention Problems Delinquent Behavior Aggressive Behavior</td>
<td>Invalid due to multiple response</td>
<td>PTSD NEGATIVE 41</td>
<td>PTSD NEGATIVE SUB-SYNDROMAL PTSD+</td>
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<tr>
<td>16</td>
<td>Female</td>
<td>Cycling home when a car did not stop immediately at a give way sign, startling her, and her grocery bag became stuck in her wheel spokes. She was thrown over her handlebars. She sustained grazes to her body and lost a tooth.</td>
<td>17</td>
<td>Clinical Range: Nil</td>
<td>Nothing of significance</td>
<td>PTSD NEGATIVE 36</td>
<td>PTSD NEGATIVE SUB-SYNDROMAL PTSD+</td>
</tr>
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<tr>
<td>17</td>
<td>Male</td>
<td>Driving with three friends (passengers), swerved to miss another vehicle and rolled a number of times. Participant and two passengers suffered minor injuries. Other passenger was thrown from car and required hospitalisation.</td>
<td>Not Comp -leted</td>
<td>Clinical Range: Withdrawn Somatic Complaints Anxious/Depressed Thought Problems Attention Problems</td>
<td>Not Completed</td>
<td>PTSD POSITIVE 97</td>
<td>Not Completed</td>
</tr>
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<tr>
<td>No.</td>
<td>Gender</td>
<td>Age</td>
<td>Race</td>
<td>Event Description</td>
<td>Clinical Range</td>
<td>PTSD Status</td>
<td>Notes</td>
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<tr>
<td>18</td>
<td>Male</td>
<td>15 yrs</td>
<td>Maori/ NZ-Euro.</td>
<td>Travelling with older sister and her family, following a car that contained his mother, father, and younger sister (Participant #5). Witnessed his parents car collide with another vehicle. Witnessed father's death and injured body. Stayed with body until it was removed.</td>
<td>Clinical Range: Nil Borderline Clinical Range: Nil</td>
<td>UNDETERMINED*</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Male</td>
<td>11 yrs</td>
<td>NZ-Euro.</td>
<td>Was crossing a pedestrian crossing, with right of way, when two cars went through the crossing and swerved to avoid him. He jumped back to avoid being hit and was struck by a cyclist. Parent, when contacted did not report injuries to his son or list them on the questionnaire.</td>
<td>Clinical Range: Nil Borderline Clinical Range: Nil</td>
<td>NEGATIVE 19</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** NZ-Euro.= New Zealand-European  
Nil = Not significant  
* TSCC-A intended for 8-16 yrs; however, noted to be applicable to 17 yr olds (Briere, 1996).  
** Unable to determine if significant distress present due without further information (e.g., interview). Participant meets all other PTSD criteria.  
+ **SUB-SYNDROMAL PTSD** Participant meets criteria for subsyndromal PTSD as defined by Blanchard and Hickling (1997). That is, determined by being positive for Criterion B (reexperiencing symptoms) and either Criterion C (avoidance and numbing) or D (hyperarousal), but not both.
3.5 CASE REPORTS

This section presents brief case reports on the participants involved in this study. While the reports are not exhaustive, they endeavour to outline the accident and its subsequent influence on the child or adolescent involved. Rather than repeating all of the data and information gathered from the participants, the case reports present an amalgamation of both qualitative and quantitative findings. Further, points of interest or significance noted are reported.

Participant 1 (A):

A is a 13 year-old female of New Zealand-European (Pakeha) descent. She was riding her cycle to school on the footpath, as she felt unsafe on the road because she had previously witnessed cycling and car accidents on this route. While cycling on the footpath, at a reasonable pace, she collided with a car reversing out of a driveway. She incurred moderate injuries. She was thrown to the ground and sustained grazes to her face and legs, as well as a sprained ankle. She required a hospital visit of approximately two hours. Other recent life events of note included grief issues for the passing of her grandfather and a friend (both approximately two years prior).

Psychometrics (CBCL, TSCC-A, & Parent Report) and the interview (CPTSDI), at five months post-accident, revealed the following. Nothing of significance was noted on the CBCL or TSCC-A. On the three CBCL-PTSD scales, A received the following: 0 on the CBCL-PTSD-W, 0 on the CBCL-PTSD-F, and 0 on the PTSD sub-scale of the CBCL-PTSD-F. The Parent Report generated a PTSD Negative diagnosis. The only symptom noted by her mother was recurrent and intrusive recollections of the event, cued by passing the place of the RTA and by seeing other cyclists in risky situations. There was also evidence in the Parent Report of self-blame on the part of A. In the CPTSDI, A noted recurrent and distressing dreams, and event amnesia. However, there was no evidence of clinically significant distress and she failed to meet the criteria for PTSD or subsyndromal PTSD.
Participant 2 (B):

B is an 11-year-old female of New Zealand-European descent. She was riding her cycle on a downhill country road when she slipped in gravel and lost control. She was knocked unconscious for approximately five minutes. She incurred severe injuries, such as facial burns from her impact on the road, swollen lips, and a grazed hand. She required hospitalisation for four days, which included her having stitches to her forehead and nasal regions. She has sustained facial scarring due to the RTA, which may take a number of years to heal. No other significant life events were noted.

Psychometrics and the interview, at two months post-accident, revealed the following. Nothing of significance on the CBCL. On the three CBCL-PTSD scales, B received the following: 5 on the CBCL-PTSD-W, 2 on the CBCL-PTSD-F, and 1 on the PTSD subscale of the CBCL-PTSD-F. Her TSCC-A profile was invalid due to Underresponse. The Parent Report generated a PTSD Negative diagnosis. Her mother, on the Parent Report, reported that B had recurrent and intrusive recollections of the event, cued by passing the place of the RTA, viewing cycling accidents on the television, and by seeing her facial scarring in the mirror. B's mother also noted that her daughter had event amnesia, however, this is likely due to her being unconscious at the time of the accident. In the CPTSDI, B reported avoiding thoughts and feelings about the RTA, and event amnesia. However, there was no evidence of clinically significant distress and she failed to meet the criteria for PTSD or subsyndromal PTSD.

Participant 3 (C):

C is a 17-year-old male of New Zealand-European descent. He was a front-seat passenger in a car, driven by his father, returning from a sporting tournament outside his town of residence. In addition, two male friends were passengers in the rear seat. He recalled being on the open road and turning to see his father asleep at the wheel. He yelled at his father to alert him to an oncoming bend and power pole. He recalled the car slowing down and speeding up erratically due to his father's lack of control. However, they collided with the pole, which led to multiple injuries for those in the vehicle. One of the boys in the rear seat sustained a perforated bowel from seat belt injuries. The other boy, who was not in a seat belt, was thrown forward over the front seat, his head struck the
driver's floor between the accelerator and the brake pedals, leading to concussion and facial injuries. C's father incurred facial injuries and a broken ankle.

C noted that he was wedged in the car and could touch the power pole from his seat. He reported that he felt dazed and was distressed at seeing his father in an anxious state as he "frantically" checked on the boys. C incurred severe injuries. These injuries included a shattered cheekbone and nerve damage to that region of his face, he incurred a split tear duct, and a sprained wrist and lower back. He required hospitalisation for four days, without surgery, and recurrent hospital visits over the next six months for checks on his facial injuries. At two years post-accident, he still noted tingling in his cheek nerves and stated that it had been numb for a year following the crash. He also has a slightly visible dropped check on one side of his face. Following the accident, one of the boys in the accident, and his family, ceased their contact with C and his family.

Psychometrics and the interview, at 24 months post-accident, revealed the following. On the CBCL, he was in the clinical range for Attention Problems, however, he was diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) at age 14 years. Overall, he was in the clinical range for both Externalizing and his Total Problem Score. On the three CBCL-PTSD scales, C received the following: 9 on the CBCL-PTSD-W, 9 on the CBCL-PTSD-F, and 4 on the PTSD sub-scale of the CBCL-PTSD-F. On the TSCC-A, C was in the subclinical range for Posttraumatic Stress. On the Parent Report, according to his mother's responses, C met the following symptoms; intrusive and recurrent recollection of the event (cued at times by open road travel), distress at reminders, physical reaction to reminders, irritability/anger, and hypervigilance. The Parent Report generated a subsyndromal PTSD diagnosis (met symptom clusters of reexperiencing and increased arousal). Further, the Parent Report indicated the presence of anxiety, survivor guilt, and possible dissociation. Travel anxiety was indicated by the fact that his mother reported on the Parent Report that C has at times become distressed when in a car on open roads. On two occasions hitting the driver because he thought they had fallen asleep. Additionally, breathing difficulties have been observed while he is travelling.
In the CPTSDI, C reported; intrusive recollections (see below for example taken from C's diary), distress at reminders, physical reaction to reminders, behavioural avoidance (stopped playing soccer as he would have to travel), event amnesia, loss of interest/anhedonia, sense of foreshortened future, sleep disturbance, irritability/anger, difficulty concentrating (note, prior ADHD diagnosis), and hypervigilance. Consequently, C meets the diagnosis for Chronic PTSD. Of note, he was diagnosed with PTSD by a mental health worker approximately one year post-accident and attended 10 counselling sessions. Below are some excerpts from C's diary, about 12 months post-accident, describing some of his PTSD symptoms:

*Friday:* I had a daydream of the car crash and that I died...I got butterflies and had sweaty palms.

*Sunday:* I had a daydream and at 1.45pm a flashback of Dad with blood all over his face and it stayed in my mind for 5-10 mins. [minutes] so I did some breathing [relaxation technique] and it went away.

*Wednesday:* I had a view of X's [friend in RTA] head between the two pedals and beside the motor and of Dad running around...I got sweaty palms and couldn’t concentrate on my swat [studies] well.

**Participant 4 (D):**

D is a 12-year-old male of New Zealand-European descent. He was riding his cycle when he turned in front of an oncoming van believing the way was clear. He was flipped into the air and landed on the other side of the road. His doctor believed that he might have been unconscious for a few seconds during the RTA. He sustained moderate injuries, including a fractured pelvis, grazes, and cuts. He attended a GP on the day of the accident and attended accident and emergency for a short period the following day. His pelvic fracture was not noted immediately leading to unnecessary discomfort.

Psychometrics and the interview, at five months post-accident, revealed the following. On the CBCL, D was in the borderline clinical range for Social Competence. Further, D was in the borderline clinical range for Somatic Complaints, Thought Problems, and Delinquent Behavior. In the clinical range, he was noted to meet Anxious/Depressed and
Aggressive Behavior. Overall, he was in the clinical range for Internalizing, Externalizing, and his Total Problem Score. Of note, D has a previous diagnosis of ADHD. On the three CBCL-PTSD scales, D received the following: 23 on the CBCL-PTSD-W, 14 on the CBCL-PTSD-F, and 7 on the PTSD sub-scale of the CBCL-PTSD-F. On the TSCC-A, D’s profile was invalid due to Underresponse. The Parent Report generated a PTSD Negative diagnosis. The symptoms noted by his mother were physical reactions to reminders, avoidance of thoughts and feelings associated with the accident, and sleep disturbance. The Parent Report further indicated guilt and self-blame about the RTA, and an increase in crying by D since the accident.

On the CPTSDI, D noted avoidance of feelings/thoughts associated with the RTA, event amnesia (may be associated with potential loss of consciousness), emotional numbing, sleep disturbance; and hypervigilance. Therefore, D failed to meet the criteria for PTSD or subsyndromal PTSD. However, he exhibited enough symptoms and distress to indicate the presence of Adjustment Disorder (With Anxiety).

**Participant 5 (E):**

E is a 14-year-old female of New Zealand-European and Maori descent. She was travelling by car on a rural highway over the Christmas period with her family. She was seated in the back, with her mother in the front passenger seat, and her father was the driver. She recalled her father swerving to miss an oncoming vehicle that, consequently, ripped the right-side (driver’s side) of their vehicle off. E reported that she was disorientated by the crash but recalled that she noticed her father was no longer seated in his seat, that the boot was gone, and that their luggage was all over the road. She was trapped in the car and reported that her brother (participant 18), who had been following in another vehicle, was standing near the car yelling, “Dad I love you...” At this point, she became hysterical as she realised the impact of the accident, including her father’s death. Subsequently, as she was freed from the vehicle she had to crawl over her father’s crushed body. A female passer-by spent 15 minutes calming her down. E’s mother sustained facial injuries. Further, while travelling by ambulance to the hospital with her mother, E feared her mother might also die. E sustained moderate injuries, such as a bruised leg and a cut above her eyebrow, requiring around eight hours hospitalisation.
Psychometrics and the interview at two months post-accident revealed the following. Nothing of significance on the CBCL, however, her mother noted concern in regard to the loss of E's father and its impact on her. On the three CBCL-PTSD scales, E received the following: 4 on the CBCL-PTSD-W, 3 on the CBCL-PTSD-F, and 1 on the PTSD subscale of the CBCL-PTSD-F. On the TSCC-A, E was in the subclinical range for Overt Dissociation. On the Parent Report, E met the diagnosis of PTSD. Her mother noted the following symptoms; recurrent intrusive recollections of the trauma (brought on by road travel and topics discussed at school, such as road deaths and families), distressing dreams, distress at reminders, physical reaction to reminders, avoidance of thoughts/feelings related to the RTA, event amnesia, estrangement from others, sleep problems, irritability/anger, concentration difficulties, and exaggerated startle. The Parent Report also indicated the presence of depressive symptoms, fantasy denial, and possible dissociation.

E reported the following on the CPTSDI; recurrent intrusive recollections of the trauma, distressing dreams, flashbacks, distress at reminders, physical reaction to reminders, avoidance of thoughts/feelings related to the RTA, event amnesia, estrangement from others, emotional problems, sense of foreshortened future, sleep problems, irritability/anger, concentration difficulties, hypervigilance, and exaggerated startle. Thus, she received a diagnosis of Acute PTSD.

**Participant 6 (F):**

F is an eight-year-old male of New Zealand-European and Maori descent. While crossing the road, on foot, near his home, he failed to see an oncoming vehicle. The car struck him, resulting in moderate injuries, which included bruising to his pelvis. He was unable to recall much of the accident, but reported that immediately following the RTA that he was scared due to the number of onlookers and he stated that he felt that he was going to die. Further, he reported that the ambulance ride was a little distressing as they had difficulty finding a vein and repeatedly needed to jab him. He spent approximately five hours in the hospital.

Psychometrics and the interview at 12 months post-accident revealed the following. Nothing of significance on the CBCL, however, his mother reported concerns about F's
fear of crossing the road. On the three CBCL-PTSD scales, $F$ received the following: 9 on the CBCL-PTSD-W, 8 on the CBCL-PTSD-F, and 3 on the PTSD sub-scale. On the TSCC-A, $F$'s profile was invalid due to Underresponse. On the Parent Report, $F$ met the diagnosis of PTSD. His mother noted the following symptoms; recurrent intrusive recollections of the trauma (cued by having to cross the road), distressing dreams, distress at reminders, physical reaction to reminders, behavioural avoidance, event amnesia, loss of interest/anhedonia, sleep problems, irritability/anger, and hypervigilance. The Parent Report further indicated the presence of anxiety, self-guilt/blame, and increased talk of self-harm. $F$ reported the following on the CPTSDI; distressing dreams, physical reaction to reminders, behavioural avoidance, event amnesia, and irritability/anger. He failed to meet a PTSD or subsyndromal diagnosis.

Further, $F$ reported the following belief in relation to the accident, that before the accident he believed that God did not kill children but now he thinks otherwise. Additional questions revealed that $F$ was distressed at crossing the road, especially soon after the accident. At times, he would rely on adults or his younger sister to guide him across the road. His mother noted that he is now very aware of road safety. He reported that he also fears the accident may occur again. Consequently, $F$ received a diagnosis of Accident Phobia (Specific Phobia, Situational Type [roads]).

Participant 7 (G):

$G$ is a 12-year-old male of Scottish and Maori descent. He was knocked off his cycle by a car at an intersection, after he had failed to give way to the car. He reported that he remembered being thrown up in the air, falling, and then blanking out (unconscious for approximately one minute). He noted when he came around he was yelling about his legs being sore and the amount of blood on them, he fainted at this time. He next recalled waking to find he had a neck brace on and a drip had been put in place. $G$ was taken by helicopter to a nearby hospital. He noted that the hospital experience was distressing due to the number of doctors and his uncertainty about what was going on. $G$ received severe injuries. He sustained a broken leg that required nine days hospitalisation. He required a large body cast for three months, which was up to his chest, covered one leg and half of the other. He also received a number of stitches on both legs, which have left scarring.
Psychometrics and the interview at 12 months post-accident revealed the following. On the CBCL, $G$ was in the borderline clinical range for his Total Problem Score. Of note, his father reported concerns in regard to the possibility of $G$ being given a diagnosis of Attention Deficit Disorder (ADD) following the opinion of two of $G$'s teachers. On the three CBCL-PTSD scales, $G$ received the following: 9 on the CBCL-PTSD-W, 5 on the CBCL-PTSD-F, and 1 on the PTSD sub-scale. On the TSCC-A, $G$’s profile was invalid due to Underresponse. On the Parent Report, $G$ failed to meet the diagnosis of PTSD. His father reported the following symptoms, event amnesia (note, was briefly unconscious) and irritability/anger. The Parent Report further indicated the presence of self-guilt/blame. $G$ only reported event amnesia (note, was briefly unconscious) on the CPTSDI. Therefore, he failed to meet a PTSD or subsyndromal diagnosis.

**Participant 8 (H):**

$H$ is a 10-year-old male of New Zealand-European descent. While riding his scooter on a skateboard ramp, he came off and landed on his face. Subsequently, he sustained moderate injuries. He knocked out his top front teeth, cut his lower lip with his teeth, had a piece of wood puncture his lip, and sustained grazing to his face. He was taken to his GP for removal of the wood splinter and, following this, went to his dentist to have his teeth put back into place.

Psychometrics and the interview at three months post-accident revealed the following. Nothing of significance was noted on the CBCL. On the three CBCL-PTSD scales, $H$ received the following: 0 on the CBCL-PTSD-W, 0 on the CBCL-PTSD-F, and 0 on the PTSD sub-scale. On the TSCC-A, $H$’s profile was invalid due to Underresponse. On the Parent Report, $H$ failed to meet the diagnosis of PTSD. His mother reported the following symptoms, intrusive and recurrent recollections (cued by scooters, skateboards, and roller blades) and physical reaction to reminders. The Parent Report further indicated the presence of self-guilt/blame. $H$ reported no symptoms on the CPTSDI; therefore, he failed to meet a PTSD or subsyndromal diagnosis.

**Participant 9 (I):**

$I$ is a nine-year-old male of Maori and New Zealand-European descent. He was travelling by car, on the open road with his father, the driver, and older brother (participant 10),
when his father drove off the road due to impeded vision (sun) and hit a bridge. Both of
the boys were sleeping in the rear seat when the crash occurred. I reported that he dreamt
he fell out of the car. He was, in fact, thrown out of the vehicle as it rolled. He noted that
he awoke on the road to notice pain in his hand. He thought his brother and father may
have died. He required a helicopter to take him to hospital, along with his father. His
brother had gone on an earlier flight (see next). I sustained severe injuries, such as a
broken hand, cuts and scratches, and spent two days in hospital.

Psychometrics and the interview at 11 months post-accident revealed the following. On
the CBCL, I was in the clinical range for Aggressive Behavior. He was in the borderline
clinical range for Delinquent Behavior. Overall, he was in the clinical range for
Internalizing, Externalizing, and his Total Problem Score. On the three CBCL-PTSD
scales, I received the following: 8 on the CBCL-PTSD-W, 4 on the CBCL-PTSD-F, and 1
on the PTSD sub-scale. On the TSCC-A, I's profile noted nothing of significance. On the
Parent Report, I did not meet the diagnosis of PTSD. His father reported no PTSD
symptoms, however, he noted that I sometimes believes the RTA may occur again. On the
CPTSDI, I recalled no symptoms; consequently, he failed to meet a PTSD or
subsyndromal diagnosis.

Participant 10 (J):
J is a 14-year-old male of Maori descent. He was involved in the accident described
above (see Participant 9). He reported that he was “dozing” when he heard glass
smashing. He reported being upside down when the car stopped rolling and that someone
pulled him out. He noted he had pain in his back, and cuts to his legs, and that he could
not walk. He was taken by helicopter to hospital ahead of his brother (participant 9) and
his father. He incurred severe injuries, including two fractured vertebra and required one
week’s hospitalisation, as well as an additional week off school for home rest.

Psychometrics and the interview at 11 months post-accident revealed the following. On
the CBCL, J was in the clinical range for Anxious/Depressed. He was in the borderline
clinical range for Withdrawn and Attention Problems. Overall, he was in the clinical
range for Internalizing, Externalizing, and his Total Problem Score. On the three CBCL-
PTSD scales, J received the following: 15 on the CBCL-PTSD-W, 11 on the CBCL-
PTSD-F, and 4 on the PTSD sub-scale. On the TSCC-A, J’s profile revealed nothing in the clinical ranges. On the Parent Report, J met the diagnosis of subsyndromal PTSD (meet symptom clusters of reexperiencing and increased arousal). His father noted the following symptoms; physical reaction to reminders, estrangement from others, irritability/anger, concentration difficulties, hypervigilance, and exaggerated startle. The Parent Report also indicated the presence of anxiety, possible dissociation, and an increase in aggressive, antisocial behaviour. Further, J’s father noted on the Parent Report that his son has been withdrawn, aggressive, emotional, and frustrated since the accident.

J reported the following on the CPTSDI; recurrent intrusive recollections of the trauma, distressing dreams, distress at reminders, physical reaction to reminders, avoidance of thoughts/feelings related to the RTA, behavioural avoidance, loss of interest/anhedonia, concentration difficulties, and exaggerated startle. He reported being more upset than before the RTA and noted that he is worried that something is going to happen to him or his father. He received a diagnosis of Chronic PTSD. In addition, he reported that he is anxious when travelling in the car.

Participant 11 (K):
K is a 13-year-old New Zealand-European male. He was seated in the rear passenger seat with his older brother (participant 12), also present was his mother in the front passenger seat and his father, the driver. They were driving on the open road, in a van towing a large trailer when the trailer started to “fishtail”. The driver lost control of the vehicle and the van rolled at least two times and landed on its roof. K stated that he saw his brother go in front of him and out the window as they rolled. Once the van stopped rolling, K recalled his mother shouting out, “Is everyone all right?” Following this, he reported that he was somewhat confused but managed to unbelt himself from his upside down position and crawl out of the van. He stated that he repeatedly was saying, “Oh my God” and reported that there was blood on his face that was dripping on to his clothes. He reported people trying to calm him down and that he was very concerned about his brother (see Participant 12).

His mother received cuts to one of her arms, a badly cut and bruised left hand, and bruising to the left side of her body. His father sustained a bang to the head. K sustained
*moderate* injuries. He was taken to the hospital by ambulance for treatment to a cut head, which took approximately three hours admission time. Another recent stressor includes the death of a friend, who was killed along with another boy, while cycling. Psychometrics and the interview at five and a half months post-accident revealed the following. Nothing of significance on the Syndrome scales of the CBCL, but in the clinical range for Activities and Total Competence on the Competence scales. On the three CBCL-PTSD scales, *K* received the following: 5 on the CBCL-PTSD-W, 1 on the CBCL-PTSD-F, and 1 on the PTSD sub-scale. Nothing of significance was noted on the TSCC-A. On the Parent Report, *K* did not meet the diagnosis of PTSD. The following symptoms were recorded, event amnesia, loss of interest/anhedonia, and increased irritability/anger. It is further noted in the Parent Report that *K*, since the accident, has returned to sleeping with the light on, at times.

*K* reported the following on the CPTSDI; recurrent intrusive recollections of the trauma, distress at reminders, avoidance of thoughts/feelings related to the RTA, behavioural avoidance, event amnesia, emotional numbing, sense of foreshortened future, and hypervigilance. He further reported that he has been feeling “a bit down” since the RTA. Consequently, he received a diagnosis of subsyndromal PTSD (meet symptom clusters of reexperiencing and avoidance and numbing). *K* expressed a number of symptoms consistent with Accident Phobia (Specific Phobia); however, at the interview he had not had the symptoms for 6 months and, thus, failed to meet all the criteria. Consequently, he received a diagnosis of Adjustment Disorder (With Anxiety). It could be argued that in time these symptoms may dissipate or, in contrast, continue, leading to a diagnosis of Accident Phobia.

**Participant 12 (L):**
*L* is a 16-year-old New Zealand-European male. He was seated in the rear passenger seat with his younger brother (*Participant 11*), when their vehicle crashed (for details see *Participant 11*). *L* stated that he was asleep and awoke when the van started rocking. He recalled falling out of his seat belt and seeing the window coming for him. It was at this stage that he lost consciousness for a brief period (one minute maximum). He awoke to find himself laying face down, in a pool of blood, on the road with the van on top of him, pinning him down. He stated it was, “scary as hell” and that he started screaming. He was
pulled from under the van, by his father, and taken by helicopter to hospital. He sustained severe injuries, such as facial cuts that required surgery, and lacerated knees, especially the right knee that was cut to the bone. He was hospitalised for five days and needed an additional two weeks home rest. The scarring to parts of his face may last into adulthood. In addition, he has received some teasing at school due to its presence.

Psychometrics and the interview at five and a half months post-accident revealed the following. Delinquent Behavior and Aggressive Behavior in the borderline clinical range were noted on the CBCL. Overall, he was in the clinical range for Externalizing and his Total Problem Score. On the three CBCL-PTSD scales, L received the following: 9 on the CBCL-PTSD-W, 2 on the CBCL-PTSD-F, and 0 on the PTSD sub-scale. Nothing of significance was noted on the TSCC-A clinical scales. On the Parent Report, L did not meet the diagnosis of PTSD. The following symptoms were recorded; intrusive and recurrent recollections (cued by people asking about the scar on his face and being in similar vehicles), distress at reminders, and event amnesia.

L reported the following on the CPTSDI, recurrent intrusive recollections of the trauma, distressing dreams, distress at reminders, avoidance of thoughts/feelings related to the RTA, estrangement, sense of foreshortened future, and hypervigilance. Subsequently, he received a diagnosis of subsyndromal PTSD (met symptom clusters of reexperiencing, and avoidance and numbing). Further questioning revealed that, at times, L’s travel fears are quite pronounced. This, along with the other symptoms noted, would indicate a diagnosis of Accident Phobia, however, at the interview he had not had the symptoms for 6 months (as with his brother, participant 11). Consequently, he failed to meet all the criteria and, therefore, he received a diagnosis of Adjustment Disorder (With Anxiety). It may be that in time these symptoms dissipate or, conversely, continue, leading to a diagnosis of Accident Phobia.

Participant 13 (M):
M is a 13-year-old female of Dutch and New Zealand-European descent. She was travelling by car on a rural highway with her father. She described her father driving onto the other side of the road, which she attributed to the fact that he was visiting from the Netherlands where they drive on the opposite side of the road. Consequently, they
encountered a truck on a corner and they were struck by it. M reported that the truck hit her side of the car (passenger side) and pushed them into a ditch. Neither M nor her father sustained injuries (i.e., very minor injuries) requiring medical attention. Other recent stressors include family bereavement. Additionally, it was noted that her father’s brief visit from overseas was somewhat unsettling for M.

Psychometrics and the interview at five months post-accident revealed the following. On the CBCL, M was in the borderline clinical range for Anxious/Depressed and Delinquent Behavior. Overall, she was in the clinical range for Internalizing and her Total Problem Score, and in the borderline clinical range for Externalizing. Further, her mother noted (on the CBCL) M’s fear of travelling on the open road. On the three CBCL-PTSD scales, M received the following: 14 on the CBCL-PTSD-W, 9 on the CBCL-PTSD-F, and 7 on the PTSD sub-scale. Nothing of significance on the TSCC-A clinical scales was noted.

On the Parent Report, M met the diagnosis of PTSD. Her mother noted the following symptoms; recurrent intrusive recollections of the trauma (brought on by open road travel, especially when around trucks), distressing dreams, distress at reminders, physical reaction to reminders, avoidance of thoughts/feelings related to the RTA, behavioural avoidance, loss of interest/anhedonia, sleep problems, and hypervigilance. The Parent Report also indicated the presence of some depressive and anxious symptoms, and an increase in aggressive, antisocial behaviour. Her mother noted on the Parent Report that M pleaded to walk to school rather than taking the bus after the RTA, that she is rigid and unable to relax when travelling in cars, and has returned to sleeping in her mother’s bed at times.

M reported the following on the CPTSDI, recurrent intrusive recollections of the trauma, distress at reminders, avoidance of thoughts/feelings related to the RTA, event amnesia, sleep problems, and irritability/anger. She received a diagnosis of subsyndromal PTSD (met symptom clusters of reexperiencing, and increased arousal). She stated that she gets upset when in cars, especially if there are no other children around to distract her from the traffic and so forth. She also expressed that at times she had been reluctant to take the bus to school and would become upset on occasions. Thus, she exhibited features of Accident Phobia. However, as with some of the other participants, she did not fulfil the duration of
symptoms criterion of 6 months. Therefore, she received a diagnosis of Adjustment Disorder (With Anxiety), which in time may change to Specific Phobia or, alternatively, dissipate.

Participant 14 (N):
N is a 10-year-old male of New Zealand-European descent. He was travelling with his father, the driver, near their suburban home, when the RTA occurred. N recalled that his father had fallen asleep at the wheel. N yelled to wake his father who then swerved to miss another oncoming vehicle. N reported that the woman driving the other vehicle was distracted, "doing her hair". He could not recall the crash itself, however, he described that following the accident the driver of the other car was trapped in her car and had a "chunk" out of her leg. N's father sustained cuts and a bruised chest, requiring one night's hospitalisation. N received minor injuries. These injuries included a bang to the chin and a bleeding lip, which was treated at the crash site with an ice pack from ambulance staff.

Psychometrics and the interview, at three months post-accident, revealed the following. On the CBCL, N was in the borderline clinical range for Somatic Complaints and Anxious/Depressed (note, his mother reported a history of childhood anxiousness). Overall, he was in the clinical range for Internalizing and his Total Problem Score, and in the borderline clinical range for Externalizing. It was also reported on the CBCL that N has returned to using comfort blankets. On the three CBCL-PTSD scales, N received the following: 12 on the CBCL-PTSD-W, 8 on the CBCL-PTSD-F, and 3 on the PTSD subscale. On the TSCC-A, N's profile was invalid due to Underresponse. The Parent Report generated a subsyndromal PTSD diagnosis (met symptom clusters of reexperiencing and increased arousal). The symptoms noted by his mother were, intrusive recollections (especially when the driver of the vehicle he is in appears tired), distress at reminders, physical reactions to reminders, avoidance of thoughts and feelings associated with the accident, loss of interest/anhedonia, irritability/anger, hypervigilance, and exaggerated startle. The Parent Report further indicated some anxious and depressive symptoms, fantasy/denial, possible dissociation, changed eating habits, and an increase in aggressive and antisocial behaviour.
On the CPTSDI, N reported, distressing dreams, avoidance of feelings/thoughts associated with the RTA, event amnesia, and hypervigilance (especially in the car). However, N failed to meet the criteria for PTSD or subsyndromal PTSD. N added that when he is travelling with his father he feels nervous and checks to see if his father is tired. Further, he also watches the speedometer to monitor his father’s speed and tells him to slow down if he feels they are going to fast. In addition, he reported that at times he has intrusive images of the female driver’s (of the other car in the RTA) cut leg. His mother noted that his school reports indicate that he has been distracted and less focused in school, and that he has been more verbally aggressive at home since the accident. Due to the fact that N does not meet the symptom duration criterion for Specific Phobia, he did not receive a diagnosis of Accident Phobia. Therefore, he received a diagnosis of Adjustment Disorder (With Anxiety), which in time may change to Specific Phobia (Accident Phobia) or, on the other hand, dissipate.

Participant 15 (O):

O is an eight-year-old male of New Zealand-European descent. He was travelling as a rear car seat passenger on a city expressway with his father, driver, his mother, front seat passenger, and his younger brother (five year-old), rear seat passenger. An oncoming car, at high speed, struck them as they turned off the expressway. The oncoming vehicle had been racing another car at the time. O sustained no injuries (i.e., very minor injuries), his brother hit his head and was clearly distressed, and parents sustained no major injuries. A female participant in the other car received cuts to her legs. O also witnessed a car accident two months before the one he was involved in. He saw a car hit a power pole then go off the road and through a rural fence. O was present when the ambulance arrived and was concerned for the participants of the car (an elderly couple). Other recent stressors included ear surgery and starting at a new school. O pointed out that he has been teased at school about the accident by a classmate saying to him that his “mum and dad almost died”.

Psychometrics and the interview at two months post-accident, revealed the following. On the CBCL, O was in the borderline clinical range for Social Competence. In addition, he was in the clinical range for Withdrawn, Anxious/Depressed, Attention Problems, Delinquent Behavior, and Aggressive Behavior. He was in the borderline clinical range
for Somatic Complaints. Overall, he was in the clinical range for Internalizing, Externalizing, and his Total Problem Score. Further, his mother noted (on the CBCL) that she was concerned that he was not feeling good about himself and was shutting them out. She reported a childhood history of depression and ADHD. On the three CBCL-PTSD scales, O received the following: 22 on the CBCL-PTSD-W, 17 on the CBCL-PTSD-F, and 8 on the PTSD sub-scale. On the TSCC-A, O's profile was invalid due to multiple responses.

The Parent Report generated a PTSD Negative diagnosis. However, he only fails to meet subsyndromal PTSD criteria because his mother did not know if O perceived the accident as markedly distressing (Criterion A). He did in fact meet the symptom clusters of reexperiencing and increased arousal, therefore, indicating a significant level of distress. The symptoms noted by his mother were, intrusive recollections, distressing dreams, physical reactions to reminders, avoidance of thoughts and feelings associated with the accident, loss of interest/anhedonia, sleep problems, irritability/anger, difficulty concentrating, and hypervigilance. The Parent Report further suggested some anxious and depressive symptoms, possible dissociation, and aggressive, antisocial behaviour. His mother reported on the Parent Report that O often plays with toy cars, with his brother, and that they crash them all of the time. She stated that he is also having difficulty coping with day-to-day life.

On the CPTSDI, O recalled the following symptoms; recurrent intrusive recollections of the trauma, distressing dreams, avoidance of thoughts/feelings related to the RTA, emotional numbing, sleep disturbance, and irritability/anger. He also reported low mood, being nervous at times, and increased fighting with his brother. Subsequently, he received a diagnosis of subsyndromal PTSD (met symptom clusters of reexperiencing, and increased arousal). O only failed to meet PTSD by one symptom and it should be noted that he was very reluctant to talk with the interviewer and may have under reported his condition. Therefore, he received a diagnosis of Adjustment Disorder (With Mixed Disturbance of Emotion & Conduct), with features of PTSD. It may be that in time this diagnosis would be superseded by a PTSD diagnosis or Depression, or, conversely, withdrawn if criteria are no longer met.
Participant 16 (P):

P is a 12-year-old female of Maori descent. She was riding her cycle home from the grocery store when a car travelling at speed, which did not stop immediately at a signed intersection, startled her. She reported that she thought the car was not going to stop and would hit her. Thus, she took evasive action to avoid the car. Subsequently, a grocery bag she was carrying became jammed in her front wheel's spokes. This led to the cycle halting and P being thrown forward over the handlebars.

She believed she was knocked unconscious briefly (i.e., a few seconds). She reported jumping up from the road screaming out to her mother who was cycling ahead of her. P reported that she could not breathe properly at this time. She sustained moderate injuries, such as grazes to her body, including her face, and lost a tooth. She was taken to a local GP and then to the hospital to check for head injury (none noted). P recalled being in a state of “shock” after the accident for a number of hours. Other possible, recent stressors include a near accident in which P was almost hit by a train. P was on a bridge when an oncoming train led to her being “sandwiched” between the bridge and the train. Her mother, who was present at the time, reported it was a “very close call” and that P now avoids train tracks.

Psychometrics and the interview at two months post-accident revealed the following. On the CBCL, P's Externalizing Score was in the borderline clinical range. On the three CBCL-PTSD scales, P received the following: 7 on the CBCL-PTSD-W, 5 on the CBCL-PTSD-F, and 2 on the PTSD sub-scale. Nothing of significance was noted on the TSCC-A.

On the Parent Report, P failed to meet the diagnosis of PTSD. Her mother reported the following symptoms: recurrent intrusive recollections of the trauma (occur when cycling), recurrent distressing dreams, distress at reminders, loss of interest/anhedonia, and irritability/anger. Her mother noted that P, for the first three weeks post-accident, returned to sleeping with the light on.

P reported the following on the CPSTDI: recurrent intrusive recollections of the trauma, recurrent distressing dreams, distress at reminders, physical reaction to reminders,
avoidance of thoughts/feelings related to the RTA, event amnesia (note, believed she was briefly unconscious), irritability/anger, hypervigilance, and exaggerated startle. \(P\) reported that the one bad dream that she can recall involved the male driver in the car being an "evil clown". Of note, at the time of the RTA, the car driver did not stop following the accident. \(P\) pointed out that she now sleeps with her night-light on. She added that she currently gets upset more, particularly when thoughts of the accident come into her head. She recalled that sometimes when these thoughts occur that she just "freezes". She also remarked that she is arguing more at home. On the CPTSDI, \(P\) failed to meet the diagnosis of PTSD. However, she met the criteria for subsyndromal PTSD (met symptom clusters of reexperiencing and increased arousal). While she failed to meet all the criteria for PTSD, she expressed enough symptoms to receive a diagnosis of Adjustment Disorder (With Anxiety). It may be that in time these symptoms will dissipate or, alternatively, may persist, leading to another diagnosis.

**Participant 17 (Q; not interviewed):**

\(Q\) is a 16-year-old male of New Zealand-European descent. He was driving a vehicle, along with three passengers (friends), when he swerved to miss another vehicle that pulled out in front of him. He lost control of his car and slid into a paddock, rolling a number of times. Those belted in the car suffered minor injuries, including \(Q\) ("minor head and neck trauma"). However, a female passenger, who was not buckled in, was thrown out of the car sustaining injuries to her arm that required hospitalisation. \(Q\) spent time with the girl at the scene until the ambulance arrived, checking her breathing and so forth. Further, he spent "a lot" of time at the hospital with the girl until she recovered. Following the accident, \(Q\) had a number of difficulties to deal with concerning legal issues and, in addition, his car had been destroyed in the crash.

The CBCL and the Parent Report at 16 months post-accident, revealed the following. On the CBCL, \(Q\) was in the clinical range for Activities, Social, and Total Competence on the Competence scales. In addition, he was in the clinical range for Withdrawn, Somatic Complaints, Anxious/Depressed, Thought Problems, and Attention Problems. He was in the borderline clinical range for Delinquent Behavior. Overall, he was in the clinical range for Internalizing, Externalizing, and his Total Problem Score. On the three CBCL-PTSD scales, \(Q\) received the following: 32 on the CBCL-PTSD-W, 23 on the CBCL-
PTSD-F, and 11 on the PTSD sub-scale. His parents noted that they were concerned that he was suicidal, depressed, and isolated. They noted that since the accident he has had difficulty attending school due to panic attacks.

The Parent Report generated a PTSD diagnosis. The symptoms noted by his father were, intrusive recollections, distressing dreams (images of barbed wire around his neck; note, barbed wire was wrapped around the car in the accident), physical reactions to reminders, avoidance of thoughts and feelings associated with the accident, behavioural avoidance, loss of interest/anhedonia, estrangement, emotional numbing, sense of foreshortened future, sleep problems, irritability/anger, difficulty concentrating, and hypervigilance. The Parent Report further suggested the presence of anxious and depressive symptoms, increased risk-taking behaviour, decreased appetite, and aggressive, antisocial behaviour.

Clinically significant distress was determined via personal communication with Q's mother who described a number of psychological difficulties that Q was having, leading to the use of a mental health worker. She reported that he had been diagnosed with depression and was on anti-depressants. She stated that all of his psychological difficulties arose after the accident. In addition, his father stated the following on the Parent Report that his son was, “depressed, suicidal, won't talk to parents, angry, bad eating habits, sleeps all day, awake all night, won't go to college, panic attacks, never smiles”.

Participant 18 (R; not interviewed):
R is a 15-year-old male of Maori and New Zealand-European descent. He was a passenger in a vehicle that was following his parents and sister (participant 5) in another car. He witnessed his family, in the car in front of them, crash with another car (for details see Participant 5). Further, the car he was in had to swerve to avoid crashing also. His father was killed instantly in the accident. R, according to his mother, was very distressed, “pulling at his hair, face in hands, screaming, ‘Dad I love you’”. R was exposed to the graphic impact of the crash on his father's body, that is, it was crushed, multiply lacerated, disjointed, and had sustained a severed spine. R remained with his father's body, at the accident site, until it was removed.
The CBCL and the Parent Report at two months post-accident, revealed the following. On the CBCL, R was not in the clinical range for any of the scales or syndromes. On the three CBCL-PTSD scales, R received the following: 0 on the CBCL-PTSD-W, 1 on the CBCL-PTSD-F, and 0 on the PTSD sub-scale. However, his mother noted that she is concerned that he is, ‘internalising the trauma and not talking it out – especially about ‘flash-backs’ of [the] graphic scene he witnessed…”

R met all but one of the criteria for PTSD on the Parent Report. That is, the researcher was unable to give a diagnosis PTSD without interviewing the participant to determine the presence of clinically significant distress. However, the symptoms noted by his mother were; intrusive recollections (cued by being fatherless in situations, travelling, and seeing careless driving), distressing dreams, distress at reminders, avoidance of thoughts and feelings associated with the accident, loss of interest/anhedonia, estrangement, sleep problems, hypervigilance, and exaggerated startle. The Parent Report further suggested the presence of some anxious and depressive symptoms, fantasy/denial, and possible dissociation. While, clinically significant distress was not determined, his mother did note on the Parent Report that R “was not easily upset or emotional in the past, but is more so now”. PTSD was not diagnosed in this case, however, it could be argued that is present. Nonetheless, this participant appears to be expressing a significant level of psychological distress according to the information gathered from his mother.

Participant 19 (S; not interviewed):
S is an 11-year-old male of New Zealand-European descent. He was crossing a pedestrian crossing, with right of way, when two cars went through the crossing and swerved to avoid him. He jumped back to avoid being hit and was struck by a cyclist. His father did not report any injuries and noted that his son was not knocked unconscious in the RTA. The Parent Report and CBCL at six months post-accident revealed the following. On the CBCL, S was not in the clinical range for any of the scales or syndromes. On the three CBCL-PTSD scales, S received the following: 2 on the CBCL-PTSD-W, 3 on the CBCL-PTSD-F, and 0 on the PTSD sub-scale. On the Parent Report S did not meet the criteria for PTSD. Only one symptom was noted, that was that S was avoiding thoughts and feelings related to the RTA. Of note, personal communication with S’s father revealed
that S did not want to talk to the researcher about the accident. This corresponds with the avoidance of thoughts/feelings symptom noted on the Parent Report.
3.6 DISCUSSION

The aim of the present study was to explore the presence of psychological distress in New Zealand children and adolescents following a road accident experience. Further, this study sought to highlight this issue by revealing the various psychological sequelae that children involved in road accidents may endure. Although the sample was small, the results produced evidence of appreciable psychological distress in New Zealand child and adolescent road accident survivors.

The finding that 19% of the interviewed participants met PTSD criteria is comparable with other research results in this area (Di Gallo et al., 1997; McDermott & Cvitanovich, 2000; Mirza et al., 1998; Stallard et al., 1998). Further, the prevalence of PTSD symptoms, such as avoidance of thoughts and feelings related to the accident, hypervigilance, intrusive recollection, and sleep disturbance, approximated other findings (Mirza et al., 1998; Winje & Ulvik, 1998). Moreover, 69% (n = 11/16) of the interviewed participants were noted to have a conspicuous and enduring psychological reaction to their accident.

Before discussing the importance of the findings in this study, there are methodological limitations that need to be acknowledged. Firstly, the sample size was smaller than the researcher desired. Consequently, as with the first study this means that the results need to be interpreted with this limitation in mind. While the study attained respectable publicity, participants were slow to come forth. This difficulty has been reported in other studies of this kind. McDermott and Cvitanovich (2000), in regard to a study of child RTA victims, reported parent unwillingness to allow psychological evaluation of their child and that many parents expressed a feeling that their child was “unaffected” or will “get over it” (p. 451). They also noted that, “Parental consent to participate was less likely if the child sustained injuries more serious than minor soft tissue injury or abrasions” (p. 450). Curle and Williams (1996) argued in their research on PTSD in children that, “...the children in this [i.e., their] study were not representative of all the children involved in the accident [coach accident] in that children still suffering symptoms would be more likely to avoid reminders, such as the research [their research]” (p. 307). The recruitment issue is further noted as problematic by Yule and Williams (1990) who reported that adequate studies are
difficult to produce because parents are "very protective" of their children and reluctant to recognise that their children have suffered (p. 279). Thus, the small sample size and the possibility of a self-selection bias (help-seeking, opportunity for parents to express grievances or grudges) need to be considered along with the analysis of this research and considered in future road accident studies in New Zealand with young people.

A second limitation to the present research is the lack of a control group. This imposes restrictions on the extent to which the results may be generalised. However, the purpose of this study was primarily descriptive, not actuarial. Its purpose was to draw attention to the existence of psychological distress in New Zealand children following a road accident and, in addition, report the various symptoms experienced. Thus, in this regard the study has achieved its aim.

While a control group was not employed in this research, a number of child trauma samples from international studies were utilised as comparisons. Firstly, comparing the CBCL-PTSD-W findings in the current study with the samples of Rugerrio and McLeer (2000) provided an indication of the levels of child distress in New Zealand road accident survivors in contrast to a range of other populations such as children who had a history of sexual abuse or psychiatric outpatient attendance, and children who were part of a school sample. Secondly, in a similar manner, the CBCL-PTSD-F findings in the current study were compared with the samples of Friedrich et al. (under review) to illustrate the levels of child distress in this study in contrast to a range of other populations (i.e., sexually abused, psychiatric outpatient, and a normative group). Further, comparisons of subscale scores for the current study were presented for comparison with those of Friedrich et al. (under review). All of the above sample comparisons will be discussed below. Such comparisons were an essential part of this research. In the future, similar studies will need to incorporate the use of control groups as research develops from an exploratory beginning. Nonetheless, the addition of local control groups should occur along with, rather than instead of, continued international comparisons.

Results in this study indicated a high prevalence of psychological distress in children following a road accident. Apart from the diagnosis of PTSD in 19% of those interviewed (n = 3/16), a further 44% (n = 7/15) received a diagnosis of Adjustment disorder. One
(6%) further participant was diagnosed with Accident Phobia. Overall, as noted, approximately two-thirds met *DSM-IV* (APA, 1994) criteria for a psychological disorder. In addition, of the three non-interviewed participants, one was noted to have PTSD (participant 17), and, it was likely, that the one other non-interviewed participant (participant 18), probably met PTSD criteria or part thereof. If the non-interviewed participants are included in the overall findings, then 21% (n = 4/19) of the participants met PTSD criteria and 63% (n = 12/19) of the complete sample may have met a *DSM-IV* (APA, 1994) diagnosis.

Further, emotional and behavioural problems, measured on the CBCL/4-18 (Achenbach, 1991), were found to be higher in the 19 (53%) participants of this study when compared with Achenbach’s (1991) sample of nonreferred children (18%). Published norms from a New Zealand population do not currently exist. However, data from Western Australia for 321, 4-16 year-olds has been published (Garton, Zubrick, & Silburn, 1995). Australian data on the CBCL, it is argued, is more likely to be representative of a New Zealand population than data from elsewhere due to the two countries’ cultural similarities. Garton et al. (1995) reported that 11.2% of their sample were identified with a morbidity count (i.e., a *T* score of 70 or above on at least one CBCL syndrome scale). Achenbach (1991) reported 22% with *T* score of above 70 on at least one syndrome for his nonreferred sample. In contrast, the present study found that 47.4% (9/19) of the participants had a *T* score of 70 or above on at least one CBCL syndrome. This would suggest that the current accident group has an exceedingly high level of psychological morbidity. Nonetheless, it remains unclear if this morbidity existed pre-accident.

As noted, CBCL norms for a New Zealand population do not currently exist. However, two longitudinal studies (Fergusson, Horwood, & Lynskey, 1993; McGee, Feehan, Williams, & Anderson, 1992) have established levels of *DSM* disorders in young New Zealand people. Achenbach (1991) reported that a number of studies have found significant relations between the pre-1991 CBCL and *DSM* diagnoses. Achenbach (1991) pointed out that this indicated some level of convergence between CBCL syndromes and the *DSM*. Further, Edelbrock and Costello (1988) researched the convergence between the CBCL and *DSM-III* diagnoses in 270, 6-16 year-olds who had been referred for inpatient or outpatient mental health services. Edelbrock and Costello (1988) stated, “... results
indicate significant relations between scores on the Child Behavior Profile [CBCL] and child psychiatric diagnosis [DSM] derived from structured interviews. These relations suggest substantial convergence between two approaches to assessing child psychopathology, and they lend support to the validity of certain constructs common to both" (p. 228).

Although interpreted cautiously, levels of DSM diagnosis determined in the two longitudinal New Zealand studies (Fergusson et al., 1993; McGee et al., 1992) may give an indication of the levels of morbidity that would be expected when using the CBCL in a New Zealand sample. Firstly, the Dunedin Multidisciplinary Health and Development Research Unit (McGee et al., 1992) found DSM-III diagnoses in 8.8% of 11 year-olds (N = 750) and 19.6% of 15 year-olds (N = 750) based on both self- and parent report. Secondly, the Christchurch Health and Development Study (Fergusson et al., 1993) found DSM-III-R diagnosis in around 25% of 15 year-olds (N = 961) based on self- and maternal report. Therefore, based on these two studies, the rate of DSM diagnoses in New Zealand 15 year-olds appears to be in the 20 - 25% range.

The current study's finding from the CBCL data that 47.4% of participants had significant syndrome scores indicates that this accident group had approximately twice the expected levels of morbidity. This suggests that road accident victims are at a higher risk of psychological distress than non-accident victims. However, future research will need to determine pre-accident psychological status in order to establish if morbidity levels are in fact due to the road accident, are pre-existing, or a combination of the two. Moreover, while some research (Woodward, 2000) has explored the relationship between road accident injury and pre-existing psychological difficulties, additional research would need to expand on determining if pre-accident psychological disorder places the child or adolescent at a higher risk of involvement in road accidents.

In regard to the post-hoc CBCL-PTSD scales some interesting results were found. These scales are still in their infancy with respect to normative data, cut-off scores, and their validity in identifying PTSD. Certainly, it would appear that no other studies have used them with road accident victims. However, the overall road accident sample means and standard deviations did indicate that participants in this research were experiencing higher
levels of distress than the normative and school samples provided by Ruggiero and McLeer (2000) for the CBCL-PTSD-W and Friedrich et al. (under review) for the CBCL-PTSD-F and, additional, PTSD sub-scale. That is, when the road accident sample was compared with normative samples for all three of the CBCL-PTSD sub-scales, it was found that the road accident sample scored significantly higher. Additionally, the road accident sample was not found to have scored significantly differently than the sexually abused or psychiatric samples on any of the three CBCL-PTSD scales. This would suggest that road accident victims are suffering comparable levels of psychological distress as other trauma victims and those with psychological conditions. This provides further evidence of young road accident victims enduring psychological adversity following their accident.

The implications of psychological distress in children following a road accident are widespread. Not only can this distress affect the child’s functioning at home, but also their social interactions and their academic performance. Firstly, in the home environment, Stallard and Law (1994) pointed out that many adults continually underestimate the seriousness and ongoing nature of the consequences of trauma for children. They noted that this puts pressure on the child to be seen as “well”, which consequently produces feelings in the child of being misunderstood. These feelings may result in the child keeping their distress to themselves. This may place additional stress on the child and the family by straining family relationships. Further, as discussed earlier, de Vries et al. (1999) noted that parents also may develop post-traumatic symptoms following a child’s RTA. This would only act to augment the amount of distress in the family group.

Yule (1999) pointed out that following a traumatic event, children frequently want closeness, support, and comfort from their parents. While this clinginess is understandable, parents may find it very irritating, especially if the child persists in not permitting their parents to be out of their sight (Yule, 1999). Yule (1999) additionally reported that both children and teenagers might regress to younger behaviours. The present study reported that a number of the participants regressed to younger behaviours, such as sleeping in their parent’s bed, using a comfort blanket, and leaving the light on at night.
In this study, approximately one-third of the interviewed children reported both sleeping difficulties and increased anger and irritability. Certainly, these symptoms will cause stress not only for the child but for those around them. Yule (1999) reported that intrusive images frequently bother children as they settle down to sleep, so the child fights to keep awake to avoid them. Subsequently, the child becomes tired, irritable, and finds concentrating difficult. Yule (1999) stated that this irritability leads to anger, which may be difficult to cope with. This issue is illustrated in the present study by the fact that on the Parent Reports (for 19 participants) parents noted increases in a number of emotional and behavioural difficulties in their child or adolescent. For example, 53% (n = 10) noted increased irritability and anger, 37% (n = 7) reported increased sleeping difficulties in their children, and 42% (n = 8) reported that their children had lost interest in previously enjoyed activities, as well as new activities. For parents who are unaware that these behaviours are related to the accident, it could be argued that they would misinterpret these psychological symptoms as misbehaviour, being difficult, or laziness. This is likely to exacerbate distress for the child and their family.

Secondly, psychological distress, following trauma, can also affect a young person’s social functioning (Stallard & Law, 1994; Nader, Pynoos, Fairbanks, & Frederick, 1990). Pynoos, Steinberg, and Goenjian (1996) stated that transitions in peer relationships might be negatively affected. They noted that post-traumatic symptoms or behaviour, or physical scarring/deformities, may severely disrupt a child from forming close friendships, may create a feeling of isolation from peers, or encourage social exclusion. According to Nader, Stuber, and Pynoos (1991, p. 225), “Posttraumatic irritability, inhibition, or aggression can strain sibling and peer relationships”. They further noted that post-traumatic stress responses in children may include; a lessening of interest in and enjoyment of normal activities, a tendency to stay inside more or remain closer to the protection of caregivers, feelings of separation from others, and can lead to personality changes.

Changes in self-image may further effect the child or adolescent’s self-efficacy, self-esteem, or self-confidence (Pynoos, 1990). These self-image difficulties, along with social isolation and emotional withdrawal, may lead to secondary difficulties such as depression (therefore placing them at risk for suicide), anxiety, and other mental
disorders. Bolton, O'Ryan, Udwin, Boyle, and Yule (2000) noted that trauma in adolescence is also associated with depression and anxiety, as well as, PTSD. Saigh (1989) reported that in child PTSD cases, levels of anxiety, depression, and misconduct were higher than in phobic and nonclinical cases. Further, Perrin, Smith, and Yule (2000) noted that adolescent trauma survivors frequently report high levels of depression, with some expressing clinical depression, suicidal thoughts, and taking overdoses in the year after their traumatic event.

The present study found, of the 16 participants interviewed, that two reported that they felt estranged from others and another two noted a loss of interest or pleasure in previous and new activities. Four reported behavioural avoidance, which for some might impact on their outside-of-home activities as they may be reluctant to go in the car or use their cycles and so forth. Over a third (38%; n = 6) of the interviewed participants also noted increased anger and irritability. It is likely that these behaviours and emotional changes, have and, will continue to influence their social functioning.

Schooling is the third major area that psychological distress can influence following a road accident (McNally, 1996; Stallard & Law, 1994). Stallard and Law (1994; 1993) reporting on a study of children involved in a minibus accident, noted that the children reported a decline in their academic grades and difficulty finishing coursework. Unfortunately, their teachers appeared to misperceive the changes in their students as intentional laziness and strong-minded wilfulness. Stallard and Law (1994; 1993) reported that some of the teachers made negative and unfavourable remarks accusing the children of malingering. Consequently, this led to the children feeling angry and misunderstood.

It has been reported, in children who have experienced trauma, that intrusive imagery and sleep disturbance interferes with the child's ability to concentrate (Pynoos et al., 1987; Yule & Williams, 1990). The present study found that half (50%; n = 8) of the interviewed participants reported intrusive recollection. Approximately a third (31%; n = 5) reported sleeping problems that could interfere with school performance. Further, 19% (n = 3) noted difficulty concentrating. In addition, given that 44% (n = 7) reported hypervigilance, it would be likely that this would impede school functioning.
Further, McNally (1996) stated that children that are cognitively disadvantaged may be more vulnerable than others to experiencing difficulty dealing with stressful events and may be at a higher risk for developing chronic problems following trauma. Additionally, March (1999) stated that trauma can lead to an exacerbation of pre-existing learning disorders, making it harder for the child to deal with traumatic experiences. These findings only emphasise the ongoing psychological distress that may be caused if post-traumatic distress and symptoms are not attended to. According to Martini, Ryan, Nakayama, and Ramenofsky (1990), accident trauma may lead to an exacerbation and re-emergence of ADHD symptoms. This emphasises how vital it is that post-trauma distress is recognised and treated. Moreover, young road accident survivors may find themselves caught in a vicious cycle of psychological suffering if they are not provided with appropriate psychological intervention.

The findings in this study and other research in this area stress the importance of recognising post-accident psychological distress in children and adolescents. However, the psychological needs of children following a road accident stay mostly unrecognised (Stallard et al., 1998). Ellis et al. (1998) noted from their sample of 45 children, some with difficulties of significant clinical concern, that no psychological help had been provided as part of the treatment for these children. Of note, it appeared that only one participant in this study received any psychological intervention. According to Di Gallo and Parry-Jones (1996), evidence indicates that psychological disturbances are common following a road accident and, consequently, this has direct implications for any health care staff who deal with accident survivors. It is essential that health care staff be educated about the potential of psychological stress reactions (Di Gallo and Parry-Jones 1996; Di Gallo et al., 1997). Di Gallo et al. (1997) stated, “The psychological impact of an accident must be considered before discharge and, when necessary, specialist mental health advice should be sought...” (p. 361).

Importantly, hospital staff and/or general practitioners should conduct post-accident checks to evaluate how the family is coping and to screen for post-traumatic stress symptoms or other evidence of distress (Di Gallo et al., 1997). Jones and Peterson (1993) stated that doctors need to be mindful that PTSD can occur at any time, any age, and may eventuate from a number of traumatic events. Further, they pointed out that while the
family's general practitioner may not be involved in the immediate care of the trauma survivor, they may be the first to recognise emotional distress. Importantly, Jones and Peterson (1993) stated that symptoms can be treated effectively and child developmental problems avoided if the child receives immediate and appropriate therapy.

Stallard (1999) reiterated that there is a need for heightened awareness in health care professionals, parents, and young people in regard to road accidents. Further, Stallard (1999) noted that hospitals and general practitioners “need to be sensitive to the emotional needs of child accident survivors and provide parents and young people with age appropriate information about the possible psychological effects” (p. 124). This information, according to Stallard (1999), will be beneficial and help the child accident survivor normalise and understand their reactions. In addition, such information would educate parents and teachers about the potential behavioural and emotional changes that might occur and, consequently, prevent misinterpretation of the child’s functioning.

A final point needs to be made concerning the health care system. That is, the financial cost that anxiety imposes on health care resources, especially unrecognised anxiety. This issue was raised in the previous study. In summary, research (Andrews et al., 1999; Greenberg et al., 1999; & Marshall et al., 2000) has found that anxiety conditions, including undiagnosed and ineffectively treated anxiety disorders, contribute heavily to resource consumption in the health care system. For example, as noted in the previous study, 10% of all general practice costs in the United Kingdom are accounted for by patients with anxiety disorders (Andrews, et al., 1999). Further, Greenberg et al. (1999) reported that in 1990, in the United States, that each clinically anxious citizen consumed $1,542.00 US dollars in medical costs (10% of this in indirect workplace costs). Marshall et al. (2000) found that PTSD in Australian Vietnam veterans was associated with 60% higher than average medical costs. Oakley-Browne (1995) made some important comments in regard to the cost of anxiety. He reported that, “Persons with anxiety disorders are high users of all forms of health care and economic models suggest they make a significant contribution to the direct and indirect costs to the health care system and the economy” (p. 26).
Thus, considering that there is little recognition of road accident victims’ psychological suffering, there is the potential for large consumption of health care resources in New Zealand additional to that required to treat physical post-accident trauma. Given that the findings in the current study suggest high rates of anxiety in children and adolescents following road trauma, it is possible that young road accident victims may go on to unnecessarily expend health care funds over a considerable period. Further, it could be argued that the young age of these individuals could lead to lengthier periods of health care system use and compounded reliance. That is, it could be argued that young road accident victims are more vulnerable to further psychological adversity and, indeed, are at a higher risk of substance and alcohol use. Therefore, an early life experience of trauma, such as a road accident, may place the individual at risk of developing post-traumatic type symptoms. Additionally, if unrecognised or inadequately treated, the individual may go on to endure further psychological adversity and consume large amounts of this country’s limited health care system’s resources. This provides further impetus for the early recognition and treatment of psychological distress resulting from a road accident, particularly in the young. This would prevent not only unnecessary suffering for the individual and their family, but would restrict the utilisation and avoidable expenditure of health care funds. Given the current inadequate funding for mental health services in New Zealand and, consequently, a lack of resources, more emphasis on early recognition by general practitioners, teachers, and other professionals may be the key to identifying those suffering from accident-related psychological distress, that may otherwise go unrecognised, and securing the treatment they need.

In conclusion, the present study has demonstrated that New Zealand child and adolescent road accident survivors do suffer from psychological distress. Further, a substantial number of participants in this study were found to have evident and ongoing adverse psychological symptoms. Given the knowledge of what this may lead to in regard to family, social, and academic functioning, this is a finding of serious concern. As noted, health care professionals and services can play a major part in the prevention of post-traumatic psychological distress by not only increasing their own awareness and training, but by educating the families and young people involved in road accidents about post-accident distress. Additionally, they can screen for psychological distress and refer the accident survivor to mental health care when appropriate. Certainly, in this country, there
PART FOUR:
PROPOSED
SCREENING GUIDE
PART IV

PROPOSED SCREENING GUIDE

4.1 INTRODUCTION

The two studies presented thus far have evaluated the presence of psychological distress in two groups of poorly recognised road accident victims. The research has highlighted two types of road-users, cyclists and young road accident victims, who may develop psychological adversity following a road accident. The first study, on adult cyclists who have experienced an accident with a motor vehicle, revealed that around one-third of the participants were experiencing moderate to high levels of psychological distress. Notably, one-fifth of the cyclists presented with significant post-traumatic stress symptoms. In the second study, on child and adolescent road accident victims, it was found that approximately one-fifth met a diagnosis of PTSD. Overall, around two-thirds of the young people met a DSM-IV (APA, 1994) diagnosis, including PTSD, adjustment disorder, and specific (accident) phobia. Consequently, in this New Zealand research a substantial number of individuals from both of the groups assessed were experiencing considerable levels of psychological distress following involvement in a road accident.

Given the possible adverse psychological reactions that may occur following involvement in a road accident, there is, therefore, a need for greater public awareness of these consequences. Further, those in the health and schooling domains need to become more attuned to the potential distress that may develop in road accident victims. In the discussion below I argue the need to screen for post-accident distress. Further, issues central to the lack of identification of road accident survivors that may be suffering from psychological distress are presented. Following this, an initial draft of a screening tool/guide will be presented. The aim of this guide is to raise awareness of psychological distress that may occur in young road accident victims and to promote identification of those suffering this distress and, thus, increase their accessibility to mental health intervention. This is particularly important given that, anecdotally, many of the participants in the research presented reported receiving little or no information on the possible psychological consequences of experiencing a road accident. Certainly, very few received counselling in any form.
4.1.1 Why Worry About Road Accident Victims?

Blaszczynski et al. (1998) noted that continuing medical advances and enhanced vehicle safety, such as air bags and structural strength, has resulted in a larger number of road accident survivors. As a consequence, they noted that mental health professionals are progressively faced with treating the problem of persistent psychological distress in those surviving road accidents with more complex and serious injuries. Further, if accident rates remain unchanged, medical professionals will be confronted with increasing numbers of road accident survivors due to higher survival rates. Further, Blaszczynski et al. (1998) suggested that psychological distress following a road accident may be neglected because road accidents are so “common and frequent that many people, including health professionals, have become desensitised to the issue of possible posttraumatic psychological reactions” (p. 120).

Koren et al. (1999) reported that their road accident research supported the findings of other studies that injured accident victims are vulnerable to PTSD, even if the injuries are only mild. Importantly, Koren et al. (1999) found that those who go on to develop PTSD can be identified reasonably quickly post-accident. In addition, Jeavons, Greenwood, et al. (2000) stated that, “in the authors’ experience, people with relatively minor injuries may still experience significant, treatable psychological problems” (p. 360). Notably, Frommberger et al. (1998) reported that the overlap of pain, physical illness, depression, and PTSD in road accident survivors may lead to PTSD symptoms being unnoticed or misinterpreted. They thus concluded that information about psychiatric disorders associated with road accidents might be beneficial for surgeons, internists, family practitioners, and so forth.

Hobbs and Mayou (2000) noted that individuals involved in large-scale road accidents (i.e., accidents that included multiple injuries or death) may receive the psychological attention they require due to the magnitude of their accident, however, they made the following significant comments in regard to small-scale accidents:

The victims of the everyday small-scale MVA, although perhaps equally traumatized [as those in more serious accidents], obtain little support and no public sympathy. Written and oral information about the common
psychological consequences of MVAs can be given to patients who are admitted and those who attend hospital follow-up, but it is likely to be more effective to publicize the importance of assessment and treatment to general practitioners and other staff in primary care, and to lawyers and motoring organizations. Better care will depend not only on much greater medical awareness, but also on public awareness that suffering anything more than immediate, moderate distress after a road accident is an appropriate reason for medical consultation. However, active encouragement to seek help would be required for the numerous traumatized MVA victims who display significant degrees of avoidance, specifically avoidance of the distressing recall of their traumatic event (p. 151-152).

Further, Mayou (1997) noted that, despite some unknowns in the area of psychological consequences following a road accident, there are no qualms in arguing that they create a significant clinical problem. Mayou (1997) noted that problems are best recognised during the period of recovery rather than immediately after the accident. Immediate responses may give some indication to the risk of psychological sequelae, but Mayou (1997) argued that it is more appropriate to focus on early identification and then on giving individually formulated assistance to meet specific needs. Mayou (1997) added that the challenge for health services is how to accommodate the considerable number of people involved in road accidents, particularly when a substantial number of road accident victims are not systematically followed up. He proposed that the long-term response would appear to be an issue of awareness of a need to acknowledge problems, on the part of primary care doctors, specialists, and other health care professionals concerned in the care of road accident survivors. Importantly, Mayou (1997) observed that this may be contingent on a wider public understanding that psychological distress and difficulties following a road accident are both common and treatable.

Additionally, based on the finding that accident cognitions were more predictive of subsequent trauma than other variables (e.g., severity of injury), Jeavons, Greenwood, et al. (2000) reported that when accident victims are seen in hospitals by clinicians screening for consequent trauma symptoms, attention should also be focussed on those who are distressed and afraid that they could have lost their lives, rather than
attending to only those who are seriously injured. Jeavons, Horne, and Greenwood (2000) noted that this signifies the need to focus on an accident survivor’s emotional reactions following their accident. That is, those who have strong emotional responses or who are excessively preoccupied with what has happened or who appear to avoid coming to terms with the accident may be at a higher risk for developing trauma symptoms (Jeavons, Horne, et al., 2000). Jeavons, Horne, et al., (2000) stated, “The ability to target people who may be vulnerable to later posttraumatic reactions following a traumatic event, such as a road accident, may enable early preventive intervention. There is a need therefore to follow up such people and document the progression of symptoms and identify possible antecedents” (p. 213).

Jeavons (1999) made another valuable point that is related to role of health care professionals involved with road accident survivors. Jeavons observed from her Australian research that some individuals who had been in a road accident were extremely embarrassed about their symptoms and that their relatives and friends tended to minimise these symptoms by suggesting the accident victim should get over the accident promptly. Consequently, if the accident survivor was suffering from symptoms such as nightmares, travel anxieties, and other distressing occurrences, they tended to fear they were going crazy. Jeavons (1999) noted that this diminished the probability of the person discussing these symptoms with their health care professional, and, therefore concluded, “Education about the ‘normality’ of these symptoms after a traumatic experience was sometimes a great relief for sufferers” (p. 221). Accordingly, it is argued that any attempt by health care workers to screen and educate road accident survivors about possible psychological reactions will, at least, provide some sense of relief to these individuals. Further, education from health workers would provide a knowledge-base that may encourage individuals to seek help if they recognise the development of any psychological symptoms in themselves or their family.

While noting the current debate about the effectiveness of debriefing and its potential to harm rather than aid in the aftermath of road accidents, Mayou, Ehlers, and Hobbs (2000) made some salient remarks. They noted that while debriefing should not be used, this does not mean denying immediate support and practical assistance for road accident victims. Further, they stated that they do not object to efforts to improve the
detection of noteworthy problems in the weeks and months after the accident. They remarked that there is support for psychological therapies following trauma and that they can be effective. They advocated offering immediate psychological, social and practical aid to those in need following a road accident and they noted the convalescence phase as the optimal period for recognising those individuals who will most benefit. Mayou, Ehlers, et al. (2000) stated, "We suggest immediate support and practical help, together with follow-up, to identify those with persistent problems who may benefit from extra help" (p. 593).

4.1.2 Associated Costs of Road Accidents

Earlier in this paper, the costs of undiagnosed anxiety were discussed. To further emphasise this issue Frommberger et al. (1998) reported, from their research, that untreated psychological consequences of road accidents, including PTSD, led to lengthier hospital stays and, thus, more cost than for non-PTSD patients. Vingilis, Larkin, Stoduto, Parkinson-Heyes, and McLellan (1996) found that even though about half of their serious accident sample rated their general health as good to excellent at one year post-accident, self-reported medical consumption was high, with over 93% needing out-patient medical care after their discharge. They added that there was an average of 43 outpatient appointments during the year after their accidents. Further, a substantial amount of work was missed by these road accident victims. Thus, Vingilis et al. (1996) remarked that serious accidents signify a major economic burden.

Further, Landsman et al. (1990) found in their research, based on a sample largely made up of road accident victims, that injuries and hospitalisation resulted in substantial difficulties with work and money for a considerable number of the participants. One-third noted injury-related difficulties with work, such as being prevented from working, and 30% noted the occurrence of a sizeable decrease in their income due to their accident. Landsman et al.'s (1990) study noted that other factors need to be considered in post-accident follow-up by health care workers. These factors included social work assistance to manage financial and employment difficulties, family counselling to deal with stress and the support needed for the accident victim, as well as the consideration of psychological therapy.
The social costs of road accidents can be substantial and are not only due to any injury incurred. Other costs may be associated with financial difficulties that may result from an increase in living expenses (e.g., related to disability or health costs), incapacity to work, loss of vehicle, and psychiatric problems (Hobbs & Mayou, 2000). Hobbs and Mayou (2000) reported that those with more severe injuries are more prone to suffer the greatest social difficulties, however, they remarked that even those who do not sustain physical injury may recount significant social problems occurring due to financial losses and post-traumatic psychiatric difficulties. Hobbs and Adshead (1997) noted that, "Chronic post-traumatic disorders are costly in terms of the patient’s reduced capacity to work, the destructive impact on the family, and the demand on health resources" (p. 161).

In addition, Vingilis et al. (1996) stated that post-accident psychosocial and economic consequences were common in road accident victims. They noted between one-third to one-half experienced depression, anxiety, stress, financial problems, driving fears, headaches, sleeping problems, dizziness, memory and concentration difficulties, temper difficulties, and family stress and disruption since their accident. Further, New Zealand research (Taylor, Deane, and Podd, 1999) on individuals who are driving-fearful, to a subclinical degree, found that unless they are offered an intervention to attend to their fears, some of these individuals may experience an increase in the severity of their driving-related fear. Taylor et al. (1999) stated, "Clearly, this suggests that we cannot simply ignore this particular fearful group, and some level of intervention may be warranted" (p.938).

In considering the cost of road accidents to society, a related issue concerns those accidents that involve individuals who drive while intoxicated. Vingilis et al. (1996) reported on a Canadian sample of injury-resultant road crash victims. Around one-fifth of the participants' blood alcohol readings were positive at the time of their accidents. Vingilis et al. (1996) found that approximately 40% reported driving after drinking, with almost 20% reporting that they may have been legally impaired. Of importance, was the finding that around 16% of the blood alcohol content-positive and 13% of the blood alcohol content-negative drivers recounted being involved in another road accident within one year post-accident. Thus it appears, as Vingilis et al. (1996) concluded, that experiencing a serious road accident does not act as a deterrent
from drinking and driving. Vingilis et al. (1996) advocated that the Canadian health care system “could and should” be the access point for working with these individuals who are at risk of developing psychosocial sequelae and who are prone to re-crashing. They noted the health care system’s role is essential, particularly since only 5% of the initial blood alcohol content-positive drivers were charged with driving while intoxicated, therefore highlighting that the criminal system may not be the most advantageous contact point.

Another population of drivers that needs to be recognised is rural road accident victims. Jeavons, Greenwood, and Horne (1998) explored levels of psychological symptoms in Australian rural road accident victims. They noted that there is little research into those involved in road accidents outside major urban areas (Jeavons et al., 1998). Results indicated that there were high levels of psychological distress, including PTSD, in their sample and that few reported receiving any counselling. This study highlights two important issues for rural road-users. Firstly, given the cultural similarities between Australia and New Zealand, the findings in this research suggest that rural road-users in New Zealand are at considerable risk of developing significant psychological reactions to road accidents. Secondly, it could be argued that rural isolation of some individuals involved in road accidents may contribute to those in less populated areas not seeking psychological assistance or, in fact, being identified as at risk by their respective local mental health agencies. Therefore, as Jeavons et al. (1998) suggested, rural road accident victims, like their urban counterparts, require recognition and treatment in order to reduce psychological distress and prevent ongoing suffering.

A related point of importance is that road accidents may also affect others than those directly involved in the accident. Hobbs and Mayou (2000) reported that witnesses to road accidents may be traumatised by what they observed, including death and dying, maimed bodies, and the accident itself (i.e., the actual crash). Such witnesses may become involved in rescue and resuscitation attempts. Importantly, Hobbs and Mayou pointed out that these witnesses may leave the accident scene without a trace. This would leave them unidentifiable to health professionals who may need to attend to the witnesses’ own psychological reactions. In addition, Watts (2000) reported that emergency employees who act in response to a road accident or who are involved in
either medical care or support might also be vulnerable to post-trauma consequences in both the short and long term. Mitchell (1999) reported that police officers are frequently exposed to horrific accident scenes, such as the death of a child in a car accident. Mitchell (1999) found in her research on police officers that 11% were experiencing considerable post-trauma symptoms. Further, family and friends of those who are fatal victims and survivors of accidents may experience emotional and psychological consequences, including the effects of bereavement (Hobbs & Mayou, 2000; Watts, 2000). Hobbs and Mayou (2000) stated that only a minority of these people will be offered or will seek help.

The discussion above outlines many reasons for recognising and addressing the need for post-accident intervention to prevent ongoing psychological distress in road accident victims. Horne (1999) cogently summarises the current need for awareness of road accident victims and the possibility of ensuing psychological distress. Horne writes:

Finally, improving the mental health status of many survivors of existing road trauma could be achieved quite easily. If the same attention were to be given to the mental health of motor vehicle accident victims as is to their physical health, much less pain, anguish and suffering would be experienced. It seems to me unpardonable, in a civilised world, that eminently treatable depression, anxiety and post-traumatic stress disorder can go undetected and untreated in motor vehicle accident survivors, whereas had they been victims of a mass shooting, or a plane or train crash, in all likelihood concerned, and even appropriate, psychological help and support would be offered by society. We now know that many survivors of motor vehicle accidents do not have their psychological problems assessed and appraised even when admitted to top-ranking health institutions, such as major hospitals.... if survivors are treated effectively they are likely to return to work and resume normal personal and social lives. In all probability effective treatment also provides significant financial and economic savings to the community. It is ironic that the motor vehicle accident is the most common disaster we all experience but is one that occupies relatively little attention and concern in society (p. 4-5).
4.1.3 Focus on Young Road-users
When reflecting on his and his colleagues work on children who had been involved in road accidents, Yule (1999) remarked that it was difficult to obtain the assistance of road accident survivors. He recalled parents saying that while they were prepared to be involved, their children were still too distressed and that the parents did not want to remind them of the accident. Thus, Yule (1999) believed that the estimates of PTSD in his research were likely to be an underestimate. Nonetheless, Yule found a rate of 20% and questioned why such levels had not been noticed previously in these children. Hence, Yule (1999) concluded, "But of course, once the child's immediate physical needs have been seen to, it is rare for them to be followed up and the brunt of emotional reactions are borne by families and schools, as well as by the children themselves" (p. 376). Importantly, Stallard, Velleman, and Baldwin (2001a) stated that just because a child does not meet the criteria for PTSD does not mean that they have not been considerably affected by their road accident. Stallard et al. (2001a) added that road accident survivors may experience a number of other noteworthy changes and reactions, such as depression, anxiety, specific accident-related fears, and negative impact on family relationships, friendships, and social activities. Therefore, the child and adolescent road-user needs to be identified as 'at risk' of developing ongoing adverse psychological distress, otherwise it is the individual, and their family and their community that will suffer.

According to Ellis et al. (1998), based on their research of child RTA survivors, it is the degree of recovery from the RTA's injuries rather, than the severity of the injuries, that are indicative of psychological response. Ellis et al. (1998) stated, "The clear implication is that all children should be screened for psychological complications following road traffic accidents, not just those with the most severe injuries" (p. 67). Stallard et al. (2001b) supported this finding with their research. They noted that at eight months post-accident, children who were still recovering physically were more likely to fulfil PTSD diagnostic criteria than those who had fully recovered.

Further, according to Stallard et al. (2001b), based on their research, children who talked about their accident were more likely to recover from PTSD in the months after their accident than those who had not discussed it.
Similarly, Stallard et al. (2001b) noted that those who had not talked about their accident were more likely at eight months post-accident to meet a PTSD diagnosis. Stallard et al. (2001b) stated, "RTA survivors should be encouraged to talk about their trauma" (p. 40). They noted that this may be more applicable to children since developmentally they may have difficulty understanding their accident. Therefore, it may be beneficial to help the child interpret the road accident in an accurate manner and to normalise emotional expression (Stallard et al., 2001b). However, the timing of this talking needs to be clarified as it remains unclear if immediate debriefing with children is advantageous (Stallard et al., 2001b). However, one could argue that encouraging children to discuss the accident with their parents in the weeks after the accident would be helpful. At least, it may reveal if there is distress that needs to be attended to further by health professionals. Consequently, this argument would support the dissemination of knowledge about the potential of adverse psychological sequelae following road accidents.

According to de Vries et al. (1999), "If clinicians use severity of injury as a guideline for referral to psychological follow-up services, many children at risk for PTSD after minor traumatic injury may be overlooked" (p. 1298). They added that "Physicians managing the pediatric trauma patient, regardless of injury severity or intent, should screen for PTSD and refer for treatment where appropriate" (p. 1299). They advocated that doctors who attend to children who have incurred even minor injuries should question both children and their parents about symptoms that may reveal post-traumatic sequelae. Both children and their parents should be further evaluated if they suffer from symptoms indicative of post-traumatic distress, such as sleep disturbances, hypervigilence, intrusive thoughts, and avoidance (de Vries et al., 1999).

Of note, children of a younger age may be less likely to verbalise symptoms of distress in a comprehensible manner to their parents (de Vries et al., 1999). Consequently, parents may misjudge their children's levels of distress (de Vries et al., 1999). In addition, given the high levels of parent stress and the likely effect of parent reactions on child adjustment following RTA injury, the significance of addressing parental responses, when assessing their children, cannot be emphasised enough. As suggested by de Vries et al. (1999), when children and parents are recognised as being at risk for psychological distress, consideration should be taken to ensure referral to
the appropriate support system. This is imperative, given de Vries et al.'s (1999) finding, in their research, that a substantial number of parents did not seek help for their own or their child's psychological suffering. This finding corroborates the lack of utilisation of mental health services by those suffering psychological distress (de Vries et al., 1999). Fergusson et al. (1993) reporting on a large cohort (approximately 1,000) of Christchurch 15 year-olds noted around 25% with a *DSM-III-R* diagnosis. Of these adolescents only 21% were receiving support, treatment, or therapy. Fergusson et al. (1993) stated that this finding supports that, "...psychopathology in adolescence tends to be underrecognised and untreated" (p. 1133). Further, Mayou (1997), reflecting on his earlier research on child road accident victims, stated, "What is perhaps most noteworthy is the finding that despite the severity of some of the psychiatric complications, and the impact on family life, none of the respondents had had any form of medical or social help" (p. 45).

Further, the finding that a high degree of family involvement was related to a high level of psychological welfare in road accident survivors implies that social support from the family group is essential for emotional recovery from a MVA (Ho et al., 2000). Ho et al. (2000) advocated encouraging family members to be involved in the post-accident milieu and treatment. Similarly, Cagnetta and Cicognani (1999) noted that preventative measures should be directed at accident survivors' families. This would entail providing them with information about the variety of difficulties that accident victims may experience. Ho et al. (2000) remarked that the benefits of social support include the family being able to identify the presence of symptoms, confronting the issue rather than overlooking it or neglecting its presence, and bringing to the forefront any MVA associated conflicts that need to be settled. Correspondingly, Cagnetta and Cicognani (1999) reported that the accessibility of social support, including from both road accident survivor's family and community, appears to act as a "buffer" against ongoing psychological distress and a "facilitator" for the re-establishment of stable wellbeing. Therefore, the use of the proposed screening guide will draw attention to the road accident and its possible repercussions and, in addition, promote some of the benefits discussed above.

Currently, it appears that psychological help is seldom offered to children who experience a road accident (Canterbury & Yule, 1997; Yule, 1999). According to
Canterbury and Yule (1997), "At the very least it is clear that professionals and parents need to be more aware of the emotional impact of road accidents on children, both to minimise subsequent distress and so that psychological difficulties can be identified early and appropriate help sought" (p. 69).
4.2 PROPOSED SCREENING GUIDE

Thus, as noted earlier by Horne (1999), it is inexcusable that road accident survivors go unnoticed and untreated when they can receive effective psychological intervention. Horne (1999) added, “The effort of mental health researchers and clinicians needs to be rapidly expanded so that appropriate psychological help for survivors becomes the norm rather than the exception” (p. 5). Certainly, early intervention at general practitioner (GP) level may prevent later recurring psychological or psychiatric clinic visits (Adshead, 1997). Stallard et al. (2001a) argued that the GP may in fact have an advantageous role in the assessment of young road accident victims. They stated, “The authors highlight that the GP is aware of patient characteristics and pre-accident functioning that allows a more critical evaluation of significant behavioural and emotional changes” (Stallard et al., 2001a; p. 34). The author of the current research fully endorses this comment and believes that the family GP could play a significant role in the detection and prevention of psychological distress in young road accident survivors. Further, according to Adshead (1997) “Most road accident survivors and their families can be managed by community services, and probably only a minority will have to seek specialist help from psychiatry or psychology” (p. 223). Nevertheless, it has been argued (Rode, 1997) that any symptom that disturbs daily functioning in a child’s emotional, behavioural, social, or academic functioning is grounds for referral or no less than further assessment.

Hence, there is an obvious need for preventative intervention for road accident survivors to decrease the probability of further psychological distress. Moreover, it appears that children and adolescents may be more vulnerable due to an inability or reluctance to voice their suffering. Cagnetta and Cicognani (1999) noted that robust attempts should be made to enhance the associations between formal and informal services in the community, i.e., to advance links between health services, social services, volunteer associations (e.g., victim support), and self-help groups that are involved or could be utilised in post-road-accident care (Cagnetta and Cicognani, 1999). This would result in a more comprehensive network available to road accident victims. Importantly, Cagnetta and Cicognani (1999) commented that difficulties suffered by road accident victims are frequently due to an absence of integration of services in the community they are a member of. Subsequently, Cagnetta and
Cicognani (1999) stated, "Improving our knowledge of the victims' life experiences, needs, and difficulties, and sharing such knowledge may constitute a good starting point and a stimulus for well-designed interventions, aimed at allowing survivors of MVAs a better quality of life" (p. 563).

Thus, there lies before those of us in the road accident field a sizeable challenge, which is to raise awareness of the psychological distress that may confront road accident victims. The discussion above has highlighted a number of areas where such awareness and secondary prevention may occur, such as in hospitals or at a community level. However, the author proposes to target a subgroup of road accident victims, namely children and adolescents, at the general practitioner and school levels. The proposed guide presented below is an initial draft of a booklet that aims to inform GPs, teachers, and school counsellors about the various ways that psychological distress following a road accident may become manifest. The guide, rather than substituting a comprehensive psychological assessment, educates the user how to detect and identify signs ('flags') that a child or adolescent may be suffering from psychological adversity following a road accident. Consequently, it is a guide on how to recognise that an individual is experiencing psychological distress and, if so, directs the user to monitor the young person or refer them on for further psychological assessment or treatment if deemed necessary.

The guide's concept and structure is to some extent based on another guide that was designed to assess psychological factors in individuals with back pain, namely the: Guide to Assessing Psychosocial Yellow Flags in Acute Low Back Pain: Risk Factors for Long-Term Disability and Work Loss (Kendall, Linton, & Main, 1997). The guide created by Kendall et al. (1997) utilises 'yellow flags' that are noted as psychosocial risk factors that enhance the risk of developing, or maintaining long-term disability and work loss related to low back pain. Kendall et al.'s (1997) guide provides a method and a systematic approach to screening for psychosocial factors. The proposed guide for young road accident victims adapts elements from Kendall et al. (1997) and builds upon their structure to generate a guide that is relevant to the recognition of psychological distress that may develop in child and adolescent road accident victims. It aims to promote awareness of these road accident victims, the
possibility of arising psychopathology, and, ultimately, provides a pathway for these individuals to further psychological intervention.

It should be noted that this is a work in progress. It is hoped that in the near future this draft will be presented to those who may use it for reviewing and critique. Following this, the author and his supervisor, Neville Blampied, will acknowledge the comments of those who review it and modify the guide to make it more 'user-friendly'. Further, it is anticipated that some in the field of clinical psychology will also review the guide in order to appraise its applicability. Thus, this initial draft is the first step in an ongoing process to develop a tool that will bring much needed attention to young road accident victims and, in due course, lead to them obtaining accessibility to mental health services that may be essential for symptom relief and general wellbeing.
Guide to Assessing Flags for Psychological Distress in Young People Following a Road Accident
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Who & what this guide is for?
This guide is designed for the early detection of psychological distress in school-aged children and young people, aged five to eighteen years, following involvement in a road accident. This guide was prepared for general practitioners (GPs), teachers, school counsellors, and others who are involved in the care of young people. This guide aims to give those in contact with young people the ability to identify signs and symptoms of psychological distress following a road accident. It does not substitute for clinical assessment but rather indicates if a child or adolescent is experiencing psychological distress and needs to be referred on for specialist help for assessment and treatment. The aim is to prevent ongoing psychological adversity.

Why is there a need for such a guide?
Road accidents are frequent occurrences in our society. Research has found that those who have been involved in road accidents, including children and adolescents, may be vulnerable to varying kinds and intensities of psychological adversity. Psychological distress may result regardless of the type of accident (e.g., cycling, car, pedestrian, witness), the severity of injury (i.e., no injury to serious injury), and other factors. Distressing psychological reactions in children and young people can include upsetting thoughts, difficulties with sleep, difficulties with concentration and memory, irritability, mood problems, anxiety, and post-traumatic stress disorder.

What are flags?
Flags are symptoms or occurrences that may develop following involvement in a road accident. Flags are warnings that indicate that the individual is experiencing psychological distress that may require further attention from a mental health specialist. On page 5 there is a list of a number of symptoms or occurrences (flags) that may develop in children or adolescents following a road accident. A number of these flags are designated as 'red flags'. These are symptoms that indicate that the young person is experiencing significant psychological distress or risk of harm to themselves. These 'red flags' require that the child or adolescent receive immediate specialist psychological attention from a psychiatrist, psychologist or other mental health specialist.
How to judge if a young person is at risk

Research suggests that up to one-third of young persons who experience a road accident may develop significant psychological distress. In the month following a road accident, it is expected that young people will experience some degree of distress, i.e., they will experience a number of the symptoms discussed in the section to follow. For example, they may have difficulties with sleep, have unwanted thoughts about the accident, and may be fearful of road travel. These symptoms should, however, begin to lessen in severity (i.e., the level of distress they cause), frequency (i.e., how often they occur), and amount (i.e., the number of different symptoms) at around four weeks post-accident.

School Personnel:
If this is not the case, the following is suggested. In the immediate month after the accident, parents, teachers, and school counsellors should monitor and evaluate the child or adolescent’s behaviour. As noted, a number of symptoms may appear. If the user of this guide is concerned that these symptoms are causing high levels of distress then they should discuss this with the individual’s parents and suggest visiting a GP. On the other hand, if there are symptoms present but they appear not to upset the child or adolescent too greatly, then the parent, teacher, or school counsellor should continue to monitor the individual’s behaviour. Following a one-month period post-accident, the person monitoring the child needs to note if these symptoms are beginning to lessen. If this is not the case, it is important that the child or adolescent receives attention from their GP. It is also important to recognise that children and adolescents may develop symptoms one or more months after their accident. If this occurs, again monitor the child or adolescent and refer them to their GP if the symptoms are distressing to the child or adolescent or lead to behavioural changes or deterioration of academic performance. If a ‘red flag’ is noted or thought to be present in the young person then refer them on to a school counsellor or GP immediately.

General Practitioners:
For general practitioners, the initial presentation may immediately follow the accident or may occur later following self, emergency services, family, or teacher referral. As
noted earlier, in the initial month following the accident some symptom development is expected. However, these symptoms should diminish in severity, frequency, and amount from month one onwards. If this does not occur or the individual presented after one-month post-accident, then the GP needs to assess the symptom presentation (i.e., severity, frequency, & amount) and the level of distress this is producing in the client. The GP can either continue to monitor the child or adolescent if they feel there is no risk of ongoing psychological distress or that the symptoms are lessening. However, if the GP has any concerns that these symptoms are affecting the client’s wellbeing then it is essential that they refer the client on to a mental health worker for further psychological assessment and intervention, unless they are able to provide this intervention herself/himself. If a ‘red flag’ is noted or thought to be present in the young person, refer them on immediately if you do not have the skills or knowledge required to provide psychological intervention to manage the young person’s psychological condition.
**Flags:**

A number of symptoms and occurrences may develop or occur in young people following a road accident. Below is a summary of these symptoms, referred to here as flags. Further, some examples of each flag are given with each summary. Red flags signify that the young person needs immediate psychological attention.

**Recurrent & intrusive accident-related images**

Recurrent and vivid accident-related memories are frequent in road traffic accident (RTA) survivors. Children may describe detailed memories of their accident. These memories may be triggered by something that was associated with the accident (e.g., being in a car) or may occur without warning. These thoughts may occur a number of times each day and may be accompanied by increased levels of arousal and feelings of panic. For example, a child may become easily distressed or agitated when in a car or near the site of their accident.

**Recurrent distressing dreams**

An increase in distressing dreams may occur in the initial weeks after the RTA. However, for some children the dreams may not go away. Dreams may have content that is evidently related to the accident. However, in younger children the dreams’ content may not be so clearly related to the accident but are still frightening and frequent. For example, a child may wake-up from a nightmare but be unable to recall its content or an older child may have upsetting dreams in which the accident reoccurs.

**Acting or feeling like the accident was happening again**

Some young people may describe more intense and upsetting accident imagery appearing as flashbacks. They may feel, for a brief time, that they are detached from what is currently happening as they vividly picture and re-experience the feeling of the accident. For example, a child may talk about feeling disconnected from their current environment as they see before them the accident occurring again.

**Intense psychological distress to accident stimuli**

Contact with accident-related stimuli (i.e., objects, feelings, thoughts, places, & people) may produce considerable emotional distress. This is particularly noticeable in the first few weeks following the accident. For example, a child may become tearful or tense when asked about the accident or when travelling near the accident scene.
Physical reactions when exposed to reminders of the accident

Accident-related flashbacks and memories may be triggered by various stimuli. Some examples of types of stimuli are sensations (e.g., travelling fast in a car), noises (e.g., sound of a car braking), smell (e.g., smell of petrol fumes or burning rubber), and visual triggers (advertisements involving road accidents, seeing a car similar to one that was involved in their crash). Further, the child may react to reminders of their hospital experience if they attended one after their accident, e.g., while watching television programs such as Shortland Street. In addition, advertisements or news stories about speeding and drunk drivers may distress the child or adolescent.

Re-enactment through play and repetitive behaviour

Younger children may act out their accident in play. That is, they may compulsively express parts of the accident in play activities. For example, a young child may play with toy cars and crash them into each other. In addition, some children and adolescents may seek out opportunities to re-enact certain aspects of their accident. For example, a teenager may look for opportunities to drive or be a passenger in fast cars as it gives them the chance to relive part of their accident with the outcome of the experience not resulting in an accident. However, this type of behaviour may be reckless and risky to their own and others' safety.

Attempts to avoid thoughts, feelings or conversations related to the accident

The young person may try to avoid talking about or thinking about the accident. For example, the individual may appear distressed or agitated when discussing or asked to think about the accident. Alternatively, a child or teenager may actively become involved in more activities to avoid thinking about or discussing the accident.

Attempts to avoid activities, places or people related to the accident

The young person may avoid places (e.g., the accident site) or activities (e.g., going in the car, cycling) associated with their accident. The individual may become distressed, nervous, or restless when in a car or near the scene of the accident. A child or adolescent may take an alternative route to school to avoid the site of the accident. Further, they may not want to visit the relative, the friend, or the destination that was on their accident route when it occurred.

Inability to remember important parts of the accident

Sometimes the individual may be unable to remember significant aspects of their accident. For example, a child is unable to remember the sequence of events in the accident or appears to have forgotten being trapped in the car. The inability to remember important parts of the accident is quite uncommon and it needs to be taken into account if the person had in fact lost consciousness.
Noticeably reduced interest or involvement in important activities
Physical injuries may prevent the accident victim from taking part in some activities. However, some
young people who have been in an accident may disengage from social activities and family activities.
For example, a child who was quite social and active before their accident may no longer want to be
involved in playing with friends or playing sports.

Detachment & estrangement
Young people may have a sense of alienation or separation from others following their accident. They
may feel distanced or on the other hand say that they are somehow different since their accident.
Frequently, the young person may state that others do not understand the meaning or the impact of their
accident. This is especially common when there has been little no injury. Even though a child or
teenager may be around their family or friends they may feel alone or that others cannot relate to them.
Alternately, the individual may seem withdrawn and less outgoing to their family and friends.

Restricted range of emotion
The young person may become emotionally unresponsive and numb. They may appear flat and
incapable of expressing feelings or emotions. For example, a child may report that they do not know
how they feel or that they feel nothing. In contrast, some young people may appear emotionally
changeable. They may have strong feelings of anger and seem unable to control it.

Sense of foreshortened future
Accidents may lead to children and adolescents feeling vulnerable to future traumatic events. They may
appear progressively more worried that something bad will take place when they get older or seem
unable to make any plans. For instance, they may say that they are never going to get married or have
children.

Regressive behaviour, new fears, and loss of acquired skills
There may be evident regressive behaviours or loss of acquired skills in those who have had an
accident, i.e., they may relapse to younger behaviours. For example, children may revert to bedwetting,
sleeping with the light on, sleeping in their parents’ bed, and they may display reduced verbal skills.
Young persons may also go back to or develop new fears such as being afraid of the dark, general fears
of being vulnerable, being alone, going to bed, and so forth. Separation anxiety (i.e., fear of being away
from their caregiver) is common in younger children and has been found in adolescents also. For
example, a child may become clingy with their parent or teacher. Sometimes the loss of previously
acquired skills or clinginess may be perceived as intentional misbehaviour rather than accident-related.
Difficulty with sleep
Young people may experience difficulty getting to sleep, staying asleep, or early morning waking. At night, the difficulty getting to sleep may be related to being disturbed by accident-related images or thoughts. Fear of nightmares may hinder falling asleep and nightmares may disrupt sleep. Consequently, a child or adolescent may appear tired and irritable at school.

Irritability or angry outbursts
Strong emotional reactions of anger, self-blame, or irritability are often seen in road accident victims. The child or adolescent may seem more irritable than normal or easier to anger. They may display a reduced tolerance of the behaviours of friends and family, and they may respond angrily or with aggression.

Concentration difficulties
The individual may seem more distractible and unable to focus on their work or listen to instructions. Younger children may be more restless and unable to continue or complete activities. This is especially noticeable at school. It may be that difficulty with sleep and the presence of intrusive thoughts might be adding to poor concentration and academic performance.

Hypervigilance (overly vigilant or cautious/watchful)
Following their accident the young person may experience substantial nervousness, especially when travelling in a car or when near the road. They may continually search for possible danger and constantly appear fearful, anxious, or alert. For example, when in a car the child or teenager may obsessively watch the speedometer or tell the driver to “slow down” or “watch out” when it is unnecessary. At school, the child or adolescent may appear overly distractible or anxious.

Exaggerated startle (easily frightened)
The individual may be sensitive to sounds, movements, or touch. They may seem “jumpy” and are easily startled. They may appear to be on edge and react in an exaggerated manner. Family and friends often observe these reactions. For example, a child may scream and cling to their parent or teacher if a car backfires or an adolescent may be startled by a car accelerating.

Depression (low mood) & anxiety
Following an accident young people may experience problems with their mood or become anxious. They may appear down or lifeless. They may develop a number of anxiety problems. Mood and anxiety problems may be expressed in the following ways: frequent sadness and crying, withdrawal and isolation, less active, low self esteem, irritable, angry, an increase in physical complaints (headaches, stomach-aches), guilt, frequent absences from school, changes in eating patterns (i.e., eating more or less), thoughts and comments about hurting themselves, self-destructive behaviour, panic, and constantly worrisome (e.g., worried about things before they take place or excessively worried about friends or family, or that something bad is going to happen).
Drug & alcohol use
Adolescents may begin to or increase their use of substances like alcohol and drugs. This may be a way for them to dull the symptoms they might be experiencing. For example, alcohol may reduce the intensity of distressing thoughts. It is important to note any increase in substance use as it may harm the adolescent’s psychological development. Further, given that some young people may have difficulties with impulse control and may be more reckless following their accident, alcohol and drugs will only lead to more high-risk behaviours and circumstances.

Academic performance
There is often deterioration in academic performance (and/or vocational performance) following a traumatic event. Intrusive thoughts and sleeping difficulties further add to a young person's inability to concentrate and complete schoolwork. Memory difficulties may also be observed in the child or adolescent. It is important for teachers to be aware of these behaviours so that they are not misperceived as a lack of motivation or lack of interest in school activities, when in fact they may be accident-related.

Interaction with family & friends
A considerable number of young people experience changes in important family and friend relationships. Teachers and parents may observe the child or adolescent as being increasingly irritable or volatile. Further, communication difficulties may develop between the young person and their carers and teachers. Friendships (and colleague relationships) may also become strained and this is may be aggravated by the young person's irritability and anger. The young person may say that others do not understand them or the accident. They may also perceive their carers to be uncaring if they urge the child or adolescent to participate again in everyday activities.

Re-emergence or worsening of previous psychological difficulties
Following an accident, children or adolescents who have had previous psychological difficulties or learning problems may experience a return or worsening of these conditions. Teachers may observe an increase in learning difficulties or behavioural problems. For example, a child with attention deficit hyperactivity disorder may become more distractible or restless. Young persons who have had difficulties with depression or anxiety may experience a return or a deterioration of these types of symptoms.
Flag Summary Sheet for Teachers & School Counsellors

Below, and over, is a list of reactions (flags) that a child or adolescent may experience and display following a road accident. For most these reactions are brief (last less than one month), however, for a number of young people these reactions may endure and lead to ongoing psychological distress. It is important to note changes in the young person’s behaviour that have emerged since their accident. If you suspect that a young person is distressed or if they display some of the following flags for more than a month, you should encourage their parents to contact their family general practitioner. If a red flag is noted then refer them on immediately.

- Deterioration in academic performance
- Poor concentration or decreased attention
- Loss of interest in previously enjoyed activities (e.g., social & sports activities)
- Withdrawal from friends and teachers, appears to isolate herself/himself
- Avoidance of school (frequent absences)
- Headaches, stomach-aches, bowel problems, & other physical complaints
- Acts younger than their age (e.g., clingy, thumb sucking, whining)
- Misbehaving in ways that are not usual for the child/adolescent
- Anger & aggressive behaviour (fighting)
- Sudden & extreme emotional reactions
- Irresponsible &/or delinquent behaviour
- Irritability with friends, teachers, & others
- Attention seeking
- Increased hyperactivity
- Low mood (depression)
- Tearfulness & sadness
- Decrease in energy levels (may appear unmotivated)
- Appears tense, nervous, or agitated
- Easily startled & “jumpy”, increased sensitivity to sounds (e.g., loud noises, sirens, car backfiring)
- Preoccupation with the accident (e.g., repeatedly talks about it or recreates it)
- Increased use of alcohol & drugs or may appear more at risk of substance abuse (e.g., change of peer group)
- Repetitive thoughts & comments about death or dying
Child or Adolescent may report:

- Experiencing distressing and unwanted thoughts or images of the accident
- Having upsetting dreams and nightmares (note: content may be of the accident or in younger children content may not clearly be about the accident)
- Feeling as if the accident was occurring again
- Being upset by reminders of the accident (e.g., feeling nervous, scared, angry)
- Trying to avoid road travel or using their cycle, etc.
- Trying to avoid thoughts, feelings, or talking about the accident
- Trying to avoid people or places that remind them of the accident
- Feeling a lack of interest in school, home, or social activities
- Feeling alone, changed since the accident, that others do not understand them
- Feeling flat or no emotion
- Feeling angry or irritable
- Feeling down, sad, or nervous
- Feeling they have no future or that another threatening event may happen again to them or those they love
- Feeling on edge, tense, fearful, and on the lookout for danger
- Feeling "jumpy" or easily frightened/startled
- Trouble getting or staying asleep
- Trouble concentrating at school
- Problems with school work
- Problems at home with family relationships
- Problems with friends

- Adolescents may report abusing drugs or alcohol
- Having thoughts about dying or hurting themselves
Flag Summary Sheet for General Practitioners

Below, and over, is a list of reactions that a child or adolescent may experience and display following a road accident. For most these reactions are brief (less than one month), however, for a number of young people these reactions may endure and lead to ongoing psychological distress. It is important to note changes in the young person’s behaviour that have emerged since their accident. If you suspect that a young person is distressed or if they display some of the following flags for more than a month you should consider referral to a mental health professional for further assessment. If a red flag is noted, consider if you are able to manage the young person’s psychological condition, otherwise, refer them on immediately.

Child or Adolescent may report:

- An increase in physical ailments
- Trouble getting or staying asleep
- Not being hungry or an increase in their appetite
- Feeling alone, changed since the accident, that others do not understand them
- Feeling flat or no emotion
- Feeling angry or irritable
- Feeling down, sad, or nervous
- Having thoughts about dying or hurting themselves
- Adolescents may report abusing drugs or alcohol
- Feeling "jumpy" or easily frightened/startled
- Feeling on edge, tense, fearful, and on the lookout for danger
- Feeling a lack of interest in school, home, or social activities
- Difficulty concentrating at school or at work
- Problems with school work or vocational performance
- Problems at home with family relationships
- Problems with their relationships with their friends or work colleagues
- Problems with their teachers
- Experiencing distressing and unwanted thoughts or images of the accident
- Having upsetting dreams and nightmares (note: content may be of the accident or in younger children content may not clearly be about the accident)
- Feeling as if the accident was occurring again
- Being upset by reminders of the accident (e.g., feeling nervous, scared, angry)
➤ Trying to avoid road travel or using their cycle, etc.
➤ Trying to avoid thoughts, feelings, or talking about the accident
➤ Trying to avoid people or places that remind them of the accident
➤ Feeling they have no future or that another threatening event may happen again to them or those they love

Parents, Teachers, and School Counsellors may report:
➤ Deterioration in academic/vocational performance
➤ Poor concentration or decreased attention
➤ Loss of interest in previously enjoyed activities (e.g., social & sports activities)
➤ Withdrawal from family, teachers, and friends, isolates herself/himself
➤ Avoidance of school/work (frequent absences)
➤ Headaches, stomach-aches, bowel problems, & other physical complaints
➤ Acts younger than their age (e.g., clingy, thumb sucking, whining, bed-wetting, sleeping with the light on)
➤ Misbehaving in ways that are not usual for the child/adolescent
➤ Anger & aggressive behaviour (increased fighting with classmates or siblings)
➤ Sudden & extreme emotional reactions
➤ Irresponsible &/or delinquent behaviour
➤ Irritability with family, friends, teachers, & others
➤ Attention seeking
➤ Increased hyperactivity
➤ Low mood (depression)
➤ Tearfulness & sadness
➤ Decrease in energy levels (may appear unmotivated)
➤ Appears tense, nervous, or agitated
➤ Easily startled & “jumpy”, increased sensitivity to sounds (e.g., loud noises, sirens, car backfiring)
➤ Preoccupation with the accident (e.g., repeatedly talks about it or recreates it)
➤ Increased use of alcohol & drugs or may appear more at risk of substance abuse (e.g., change of peer group)
➤ Repetitive thoughts & comments about death or dying
What are the consequences of not identifying flags (psychological distress)?

Not recognising that a child or adolescent is experiencing psychological distress (flags) may leave them vulnerable to ongoing and disabling psychological suffering. Given that young people are still developing in terms of their personality and their psychological make-up, continued exposure to psychological adversity may have a negative impact on their future functioning and psychological stability. Further, psychological distress, if left unchecked, can cause deterioration in family and peer relationships, impede academic/vocational performance, and reduce quality of life. Given that psychological distress following a road accident can be effectively treated, it is important to seek the assistance of a GP or mental health worker if there is any concern about the child or adolescent’s mental welfare. Contacting your local GP or mental health service will help determine if the child or adolescent needs further psychological assessment.

What are the consequences of over-identifying flags (psychological distress)?

Over-identifying flags may unnecessarily waste health resources. Further, overwhelming a child or adolescent in the immediate weeks following an accident may disrupt his or her own natural coping abilities. Therefore, unless the individual expresses significant psychological distress, in the month after their accident, it is best just to monitor their progress. Thus, following a three to four week period post-accident, assistance from a GP and/or mental health worker is encouraged if there are any concerns. Certainly, given the benefits of identifying psychological distress, that is the prevention of ongoing suffering, it is best to be cautious rather than neglecting an individual in need of help. Failing to recognise that a child or adolescent needs psychological attention could lead to chronic psychological suffering.
TEACHERS:

INITIAL PRESENTATION

Within 4 weeks of road accident?

Monitor child/adolescent, is there evidence of:
- Marked distress?
- Red flags?

Is there evidence of:
- Marked distress?
- Flags?

Continue to monitor child/adolescent frequently for flags:
- Are flags evident after 4 weeks?
- Is there marked distress?
- Red flags?

Continue to monitor child/adolescent periodically for flags (up to 12 months):
- Are flags evident?
- Is there marked distress?
- Red flags?

Contact/Refer to school counsellor or GP

School Counsellors:

Within 4 weeks of road accident?

Monitor child/adolescent, is there evidence of:
- Marked distress?
- Red flags?

Is there evidence of:
- Marked distress?
- Flags?

Continue to monitor child/adolescent frequently for flags:
- Are flags evident after 4 weeks?
- Is there marked distress?
- Red flags?

Continue to monitor child/adolescent periodically for flags (up to 12 months):
- Are flags evident?
- Is there marked distress?
- Red flags?

Do you have the knowledge & skills to provide intervention & manage the child/adolescent's condition?

Proceed with intervention. Are therapeutic gains and expected progress occurring in the absence of red flags?

Refer to mental health service or GP

General Practitioners:

Within 4 weeks of road accident?

Monitor child/adolescent, is there evidence of:
- Marked distress?
- Red flags?

Is there evidence of:
- Marked distress?
- Flags?

Continue to monitor child/adolescent frequently for flags:
- Are flags evident after 4 weeks?
- Is there marked distress?
- Red flags?

Do you have the knowledge & skills to provide intervention & manage the child/adolescent's condition?

Proceed with intervention. Are therapeutic gains and expected progress occurring in the absence of red flags?

Refer to specialist mental health service
Helpful websites
Below is a list of valuable websites that give additional information on psychological distress following trauma such as a road accident. Further, some of the websites discuss how a child or adolescent may appear if they are suffering from anxiety, depression, post-traumatic stress disorder, and so forth.

- American Academy of Child & Adolescent Psychiatry
  www.aacap.org/publications/factsfam/index.htm
  This site has a number of useful fact sheets on it related to various child and adolescent psychological conditions. Of note, refer to the following fact sheets:
  Posttraumatic Stress Disorder (Fact sheet # 70)
  Helping Children After a Disaster (Fact sheet # 36)
  The Anxious Child (Fact sheet # 47)
  The Depressed Child (Fact sheet # 4)

- American Psychological Association Online
  www.apa.org/practice/ptguidelines.html
 Fact sheet: Reactions and Guidelines for Children Following Trauma/Disaster

- National Center for PTSD (Post-Traumatic Stress Disorder)
  http://www.ncptsd.org/facts/specific/fs_children.html
  Fact sheet: PTSD in Children & Adolescents

Acknowledgements
The author of this guide acknowledges the following sources and particularly thanks researcher and clinical psychologist Paul Stallard.

The aim of this thesis was to examine post-accident psychological distress in two groups of road accident victims who have received only minimal attention in the research literature to date. The first of these two groups, cyclists, was investigated in the first study of this thesis. Twenty-seven adult cyclists who had experienced a road accident within the past 12 months participated in structured interviews and psychiatric assessments. Results indicated that around one-third of the cyclists were experiencing psychological distress, with one-fifth noting significant levels of post-traumatic stress. These figures are comparable with other road accident research in terms of the levels of psychological suffering. This study confirms that cyclists, no less than other road-users, are vulnerable to psychological distress following accidents, and supports continuing research embracing all categories of road-users, including pedestrians, cyclists, motorcyclists, car occupants, and bystanders. Future research into cyclists and other less researched road-user groups might be improved by the inclusion of a structured clinical interview to assess for psychopathology. This would be comparable to the research of Blanchard and Hickling (1997) with the inclusion of the Clinically Administered PTSD Scale (Blake et al., 1990) in their MVA Interview. This would verify information collected by other sources and would provide more detailed information on symptom presentation that could be compared to that from other road accident victims (e.g., car occupants).

The second study in this thesis explored the presence of psychological distress in New Zealand children and adolescents following a road accident. Results indicated that of the 16 participants who were interviewed, around one-fifth developed PTSD following their accident. Overall, two-thirds were experiencing some level of post-accident psychological distress. Given the large numbers of children and young people exposed annually to road accidents, these findings highlight the need for health services in New Zealand to recognise and treat post-accident distress in young people. Failure to treat this distress may lead to chronic psychopathology, disruptions in academic performance, and negative influences on both family and social environments. This study, therefore calls for increased identification of young road
accident victims who are at risk of developing psychological distress and effective intervention for them.

In regard to this road-user group, there are a number of areas that could be further explored. Firstly, the role of Acute Stress Disorder in this age group is of interest. For example, what is its predictive value as a precursor for PTSD in young road accident victims and how does it manifest in this population? Secondly, more attention needs to be given to other predictors of psychopathology in young road accident victims, such as, what symptoms immediately following the accident are important for health care professionals to look for and how do these differ from those of adult accident survivors? Thirdly, the role of substance use in young road accident victims is of importance. There are a number of issues here, including the contribution of substance use to the accident, its role in the development of post-traumatic symptoms, and, of great importance, are those young people who have experienced a road accident more vulnerable to increased substance use and how should health care specialists intervene? Given the prevalence of alcohol intake and the increased availability of illicit substances, such as ecstasy, amongst New Zealand's youth, combined with the frequency of road accidents, we need look at the potentially damaging post-accident interaction of these factors.

Lastly, this thesis developed a screening guide for use by teachers, medical practitioners, and others for the identification of those young people at risk of developing psychological distress following a road accident. This was viewed as a potentially useful step toward recognising and helping those young accident victims who may be enduring unnecessary psychological distress. Future development of the Guide would include validation of its use with young road accident survivors and the evaluation and advancement of its utility with teachers and health care practitioners. Other possibilities include expanding its use to include younger children (i.e., 1-5 year-olds) and making it accessible to parents. The dissemination of information about post-accident distress, and the distribution and implementation of a resource such as this Guide, is now a priority if we are going to reduce needless accident-related psychological distress in young New Zealanders.
REFERENCES


Appendix A

Study One: Newspaper Article
Pioneering accident research looks at psychological effects

According to Street Skills, a steering group of health, cycling, and safety organisations including Cycling NZ and Cycle Support, there are approximately 760,000 bicycles in New Zealand.

In 1996, 1449 New Zealand cyclists were admitted to hospital as a result of cycling accidents. In the same year, the Christchurch City Council found that 177 cycling accidents were reported in the Christchurch area.

While there have been a number of studies investigating the extent of physical injuries resulting from cycling accidents, there appears to have been no research into the possible negative psychological effects experienced by individuals following a cycling accident.

The current study aims to explore the range of psychological consequences that may occur in individuals who have been in a cycling accident that involved a collision with a motor vehicle.

A number of studies have researched how car accidents can impact on a person's mental health, but little has been done to study cyclists in this respect.

This pioneering study will provide initial research about how a cyclist's mental health may be affected by an accident. It will be done by postgraduate psychology student Lee Dymand as part of his Master of Science degree. His research is being supervised by senior lecturer in psychology, Neville Blampied.

If you have had a cycling accident in the past 12 months and would be interested in taking part in this study, please contact Lee at 364-2987 ext. 7887 or email him at: lrd17@student.canterbury.ac.nz.
Appendix B

Study One: Newspaper Article
Student seeks cycle accident victims

Cyclists who have been in an accident are being sought by Christchurch clinical psychology student Lee Dymand, who is studying how accidents can affect people's mental state.

The University of Canterbury masters student has advertised for people to interview. He says there have been many studies looking at the effects of accidents on motor-vehicle drivers and passengers but little or nothing on cyclists. He hoped his thesis would add to the world’s knowledge about “what makes people tick”. Mr Dymand can be telephoned on 364-2987, extension 7887.

The Press (Christchurch): 28/03/00
Appendix C

Study One: Newspaper Advertisement
PARTICIPANTS WANTED
FOR CYCLING ACCIDENT
STUDY

If you are a cyclist that has been involved in a cycling accident that involved a motor vehicle over the past 12 months, please contact Lee 364-2987, ext 7867, or 384-6954. 

PRESS Classified, advertising that works. Phone 377-8778.

The Press (Christchurch): 05/03/00; 29/03/00; 01/04/00; & 05/04/00
Appendix D

Study One: General Practitioner/Physiotherapist Recruitment Poster & Letter
CYCLING ACCIDENT STUDY

Have you been involved in a cycling accident during the last twelve months? I am currently conducting research into the possible psychological responses following involvement in a cycling accident. If you have been in a cycling accident, involving a motor vehicle, and may be interested in becoming involved in this study, then please contact me.

Lee Dymand:
Ph. 364-2987 extn. 8083 or (025) 216-8870
Email: lrd17@student.canterbury.ac.nz

• PARTICIPANTS WILL RECEIVE A SMALL TOKEN IN APPRECIATION OF THEIR INVOLVEMENT.
My name is Lee Dymand, I am a clinical psychology student completing my Master's at the University of Canterbury. My area of interest is psychological reactions to accidents, specifically accidents involving a motor vehicle and a cyclist. I am interested in finding out how cycling accidents may impact on individuals' psychological well being.

The current study aims to investigate adverse psychological reactions to cycling accidents which have happened to people in the Christchurch area. Participants in the study will be initially asked to fill out three brief questionnaires that assess their responses to their cycling accident. They will be asked about mood, present avoidance of cycling activity, and questions about the cycling accident. Secondly, I will interview participants on one occasion for approximately one-hour. This interview will go into more detail in respect to how the participant’s cycling accident has impacted on their life. This will include the participant’s personal response to the accident as well as looking at if there is any current distress concerning road and cycle use.

I am writing with regard to recruiting participants. I would appreciate it if you could display the enclosed notice at your practice. Further, if you are aware of any clients that may be suitable for this study, I would be grateful if you would consider referring them to me for participation in this research. Potential participants need to have been involved in a cycling accident within the last twelve months that involved a motor vehicle. They need to be 18 years or older and, in addition, it is important that the individual was not unconscious for longer than fifteen minutes. I will be recruiting
participants through to May next year so if you could possibly keep this study in mind until then it would be greatly appreciated.

All personal details and information about the participants will be confidential and will be securely stored. The results of the research may be published but participants can be assured their personal records will remain confidential and their identity will never be disclosed. Participants are free to withdraw from the study at any time and to withdraw any information given.

I can be contacted at 364-2987 ext. 7887 or 384-6564, also through email: lrd17@student.canterbury.ac.nz. I will be pleased to discuss any issues concerning this study. Attached below is an easy reference outline for your office and detachable contact information that can be passed onto possible participants. The project is being supervised by Neville Blampied, Senior Lecturer in Psychology. Further, this research has been reviewed by the University of Canterbury Human Ethics Committee.

Yours sincerely,

Lee Dymand

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CYCLING ACCIDENT STUDY (Psychological Reactions)

Recruitment Period: Until May 2000
Participant Criteria: Cycling accident within previous 12 months that involved a motor vehicle. Participant should not have been unconscious for longer than 15 minutes. At least 18 years old.
Contact: Lee Dymand: 364-2987 ext. 7887 or 384-6564
Email: lrd17@student.canterbury.ac.nz

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Appendix E

Categories of Cycling (adapted from Atkinson & Hurst, 1983)
Fig. 1. Class A—Accidents.

Fig. 2. Class B—Accidents.
Fig. 3. Class C—Driveway Accidents.

Fig. 4. Class C—Accidents.

Fig. 5. Class D—Accidents.
Fig. 6. Class E—Accidents.

Fig. 7. Class F—Accidents.
Appendix F

Descriptions of Categories of Cycling (adapted from Atkinson & Hurst, 1983)
- **Class A accidents** (Types 1 – 4): Involve a cyclist riding out onto the road from an off-road locality (e.g., alley, driveway).
  Type 1: Driveway cyclist comes out from is residential.
  Type 2: Driveway cyclist comes out from is commercial.
  Type 3: Cyclist is riding on the footpath then turns onto the roadway at driveway apron or at a pedestrian crossing.
  Type 4: Cyclist comes onto the road over a shoulder or a kerb.

- **Class B accidents** (Types 5 – 7): These occur when the cyclist fails to give way to cross traffic at an intersection.
  Type 5: Accidents at signed intersections.
  Type 6: Accidents at controlled intersections.
  Type 7: Similar to Type 6, however, in this scenario there is multiple threat (a motorist in one lane slowed down for the cyclist but a driver in another lane did not).
  Class B Other: Cyclist failed to stop at red light.

- **Class C accidents** (Types 8 – 12): Involve a motorist failing to give way to a cyclist.
  Type 8: Motorist drives forward out of a driveway (commercial/residential).
  Type 9: Motorist fails to give way at a signed intersection.
  Type 10: Not applicable in New Zealand, therefore, not used in this study.
  Type 11: Motorist reverses out of a driveway (commercial/residential).
  Type 12: Motorist drives through a controlled intersection and makes no attempt to slow down.

- **Class D accidents** (Types 13 – 17): Accidents in which the motorist is overtaking (with the exception of Type 17) and do not include the cyclist swerving. Due to the nature of these accidents they are best understood
visually, thus, refer to Appendix E in order to understand the dynamics of these types of accidents.

- **Class E accidents** (Types 18 – 21): Accidents in which the cyclist turns or swerves, resulting in a collision with a motor vehicle that was on a parallel path with the cyclist (motor vehicle does not have to be travelling in the same direction as the cyclist).
  Again, as with Class D accidents, these types of collision are best understood visually (refer to Appendix E).

- **Class F accidents** (Types 22 – 24): These accidents take place when the motorist crashes into the cyclist who was on a parallel path. That is, the motorist turns in front of a cyclist who was continuing in a straight-ahead direction (refer to Appendix E).

- **Class G accidents**: This category is for accidents that do not fit into any of the above classes, for example, a cyclist colliding with the opening of a stationary motor vehicle’s door (labelled as Type 25 in the present study) or a cyclist becoming hooked on a car as it drives past (Type 26).
Appendix G

Cycling Accident Fear Questionnaire
The following questions are about your cycling accident and your reactions to it. Please circle the appropriate response.

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<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
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<tr>
<td>1. During the accident did you fear for your life?</td>
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<td>2. During the accident did you see anyone injured?</td>
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<tr>
<td>3. During the accident did you lose consciousness?</td>
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<td>4. Do you have nightmares about the accident?</td>
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<td></td>
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<tr>
<td>5. Are you nervous before cycling trips?</td>
<td></td>
<td></td>
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<tr>
<td>6. Are you nervous before car or other motorised travel?</td>
<td></td>
<td></td>
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<tr>
<td>7. Do you get easily distressed while cycling?</td>
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<tr>
<td>8. Do you get easily distressed in the car or other types of transport?</td>
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<tr>
<td>9. While in a car do you tell the driver what to do?</td>
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<tr>
<td>10. Do you cycle less than you used to?</td>
<td></td>
<td></td>
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<tr>
<td>11. Do you drive less than you used to?</td>
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</table>

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

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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Never avoid it</td>
<td>Rarely avoid it</td>
<td>Sometimes avoid it</td>
<td>Often avoid it</td>
<td>Always avoid it</td>
</tr>
</tbody>
</table>

Since your accident, do you avoid:

12. Cycling
13. Driving yourself (i.e., car or other vehicle)
14. Being a passenger on other types of transport
15. Cycling on certain roads
16. Driving on certain roads
17. Cycling in certain weather conditions
18. Driving in certain weather conditions
19. Hearing news of road accidents
20. Seeing wounds or injuries
21. Crossing streets alone
22. Riding a bus
Appendix H

Questionnaire on Perceived Impact of Cycling Accident
Questionnaire on Perceived Impact of Cycling Accident

You have been nominated by ______________________ to give information about how you perceive that their cycling accident has impacted their life.

It is important that the researcher obtains your unbiased opinions and for this reason it is preferred if you fill out this questionnaire independently.

Please state your relationship to the person you have been nominated by (e.g., mother, father, brother, sister, partner, friend, etc.) ____________________________

Directions: Please read the questions below and answer each one by writing one of the numbers from the scale that you think best describes how your friend/partner/son/daughter/family member acts and feels.

SCALE:
1 – NEVER    2 – RARELY    3 – SOMETIMES
4 – OFTEN    5 – ALWAYS
OR place “DK” beside the box if you do not know.

1. Does he/she show any signs of being nervous before or during cycling? □
2. Does he/she show any signs of being on edge, irritable or agitated before or while he/she is cycling? □
3. Does he/she appear nervous before or while driving a car, etc (e.g., motorcycle)? □
4. Does he/she appear on edge, irritable or agitated before or while he/she is driving a car, etc? □
5. Does he/she appear nervous before or during travel as a passenger (e.g., in car, bus, motorcycle)? □
6. Does he/she avoid cycling? □
1 - NEVER  2 - RARELY  3 - SOMETIMES  
4 - OFTEN  5 - ALWAYS  
OR place “DK” beside the box if you do not know.

7. Does he/she avoid cycling near the scene of their accident?  

8. Does he/she avoid cycling on busy roads?  

9. Does he/she avoid driving a car etc near the scene of their cycling accident?  

10. Does he/she appear nervous when seeing other cyclists on the road?  

11. Does he/she avoid talking about their accident?  

12. Does he/she discuss the accident without distress?  

13. Does he/she appear distressed or upset when discussing the accident?  

14. Has he/she had difficulty with sleeping since their accident?  

15. Has he/she had difficulty with eating since their accident?  

16. Has he/she shown any signs of being down or depressed since their accident?  

17. Has he/she shown any signs of being more than normally irritable or angry since their accident?  

18. Has he/she shown any signs of being more than normally anxious or nervous since their accident?  

19. Is he/she generally in a happy or good mood since their accident?  

Lastly, please list and describe any other changes you have noticed since the accident. In addition, comment on how you feel these changes and the accident have affected the participant’s life or any other issues you feel are important (use back of this page if needed):
Appendix I

Cycling Accident Interview (CAI)
Cycling Accident Interview

Subject # ________________________________

Subject Name ________________________________

Date of Interview ________________________________

Date of Accident ________________________________

Date of Birth ________________________________

Ethnicity ________________________________

Occupation ________________________________

Male    Female
1. What was the date of your cycling accident (CA)?

2. Can you describe for me what happened?

3. How many vehicles were involved?

4. How many cycles were involved?

5. Did you suffer physical injuries from the accident?  
   (1 = Yes, 2 = No)
5a. Please describe the nature of your injuries. (Note: injuries at time of the accident and current status).....

Description of injuries and code with:

Very minor = no medical attention

Minor = requires first aid

Moderate = visit to a medical centre

Severe = hospital admission (Note, how long- days)

INJURIES:

__________________________________________

__________________________________________

__________________________________________

HOSP.TIME:________________________________

CODE:_______

6. Was anybody else injured?

Note who they were (e.g., driver of car, passenger, pedestrian)

Description of injuries and code with:

Very minor = no medical attention

Minor = requires first aid

Moderate = visit to a medical centre

Severe = hospital admission (Note, how long- days)

WHO:_____________________________________

INJURIES:________________________________
HOSP.TIME: ________________________
CODE: __________

7. Was anyone killed? (1= Yes, 2= No)

8. Whom? (1= other motor vehicle driver, 2= others, 3= N/A)

9. Did you miss work or school because of the CA?
   (1= Yes, 2= No) ____________________________

10. If yes, how much (days) DAYS: ____________________

11. Was there damage to your cycle?
    (1= Yes, 2= No, 3= Total Loss) __________________

12. Amount of damage to cycle (dollars) $__________
13. When did you first see a physician about your accident?

14. What health specialists have you seen?

1= GP  
2= ER physician

3= Orthopaedic Surgeon  
4= Chiropractor

5= Physiotherapist  
6= Other (Note other) 

7= Neurologist  
8= Psychiatrist or psychologist

9= X-rays/CAT Scan  
10= N/A

15. What have your physical symptoms been like since the accident?

16. Are you continuing to have pain or discomfort from the CA?  (1= Yes, 2= No)
16a. If yes, note type of pain, where, severity, etc

WHERE: ____________________________________________

____________________________________________________

____________________________________________________

SEVERITY: ____________________________________________

17. Did you take pain medication shortly after the accident? (within the first month) (1= Yes, 2= No, 3= N/A)

______________________________

17a. Are you currently taking medication for the pain? (1= Yes, 2= No, 3= N/A) ________________________________

18. What medications have you been placed on? (note any type and period of use, including psychoactive)

____________________________________________________

____________________________________________________

____________________________________________________

19. Did you suffer a blow to your head? (1= Yes, 2= No)

______________________________

20. Did you lose consciousness? (1= Yes, 2= No)

______________________________
21. If yes, how long (minutes)
   MINUTES:__________________________________________

22. In the days following the accident, did you notice a drop in concentration? (1= Yes, 2= No)________________________

22a. If yes, how bad was the drop
   (0= not at all --- 10= totally unable to concentrate)
   ______________________________________________________

22b. Are you still having difficulty concentrating?
   (1= Yes, 2= No, 3= N/A)
   ______________________________________________________

23. Do you have headaches as a result of the CA?
   (1= Yes, 2= No)
   ______________________________________________________

24. If on a scale of 0-100, 100 represented your pre-CA level of functioning, what is your present level of functioning?
   ______________________________________________________
24a. What do you think is the probability of returning to pre-CA level of functioning?
(Out of 100, then change to a percentage) __________( %)

25. Are you cycling at the present time? (1 = Yes, 2 = No)

____________________________

25a. If no, 1 = cycling phobic (if yes to this get a 1-100 rating “SUDS”. 1 being fine; 100 being terrified); 2 = physically unable; 3 = no cycle; 4 = other; 5 = N/A

____________________________
26. Did you avoid any of the following conditions in the month after the CA? (1= Yes, 2= No, 3= N/A)

Cycling at night ____________
Cycling in the rain ____________
Cycling on busy roads ____________
Avoid cycling near the accident area ____________
Avoid recreational cycling ____________
Avoid sport’s orientated cycling ____________

Did you cycle to work or school/polytech etc only? ______
Did you restrict driving a motor vehicle near accident area? ______

Did you restrict driving a motor vehicle? __________
Did you restrict road travel on any transportation? ______
Did you restrict any other activities that you feel were related to the CA? (Note the activity) __________
27. In the month following the CA, did you experience any anxiety during any of the following situations? (1= Never, 2= Rarely, 3= Sometimes, 4= Often, 5= Always: or use N/A).

Cycling at night

Cycling in the rain

Cycling on busy roads

Cycling near the accident area

Recreational cycling

Sport's orientated cycling

Cycling to work or school/polytech etc

Driving near the CA area

Driving a motor vehicle

Being a passenger on motor transport (e.g., motorcycle, bus, car)

Other conditions (e.g., when seeing other cyclists on the road) (note the condition as well as anxiety level)

ANXIETY LEVEL (1-100; 100= High)
28. Currently, do you avoid any of the following conditions? 
(1= Yes, 2= No, 3= N/A)

Cycling at night ________________________________
Cycling in the rain ________________________________
Cycling on busy roads ________________________________
Avoid cycling near the accident area __________________
Avoid recreational cycling ________________________________
Avoid sport’s orientated cycling ________________________________

Did you cycle to work or school/polytech etc only? ______
Did you restrict driving a motor vehicle near accident area?
______________________________

Did you restrict driving a motor vehicle? _________________
Did you restrict road travel on any transportation? ______
Did you restrict any other activities that you feel were related to the CA? (Note the activity) ________________________________

______________________________
29. In the most recent month, did you experience any anxiety during any of the following situations? (1= Never, 2= Rarely, 3= Sometimes, 4= Often, 5= Always: or use N/A).

Cycling at night

Cycling in the rain

Cycling on busy roads

Cycling near the accident area

Recreational cycling

Sport’s orientated cycling

Cycling to work or school/polytech etc

Driving near the CA area

Driving a motor vehicle

Being a passenger on motor transport (e.g., motorcycle, bus, car)

Other conditions (e.g., when seeing other cyclists on the road) (note the condition as well as anxiety level)

ANXIETY LEVEL (1-100; 100= High)
30. During, or immediately after the accident, were you fearful or afraid? (1 = Yes, 2 = No)  
Rating (0-100, 100 = intensely fearful)

31. Did you have feelings of helplessness? (1 = Yes, 2 = No)  
Rating (0-100, 100 = completely helpless)

32. During the CA, how much danger did you feel you were in?  
Rating (0-100, 100 = extreme danger)

33. Did you feel as if you might die?  
Rating (0-100, 100 = sure I would die)

34. Currently, how vulnerable do you feel when you are cycling?  
Rating (0-100, 100 = intensely vulnerable)
34a. Currently, how vulnerable do you feel when you are driving a motor vehicle?
Rating (0-100, 100 = intensely vulnerable)

35. Currently, how vulnerable do you feel when you are a passenger in a car?
Rating (0-100, 100 = intensely vulnerable)

36. How much control did you feel during the accident?
Rating (0%-100%, 0% = no control)

37. What percentage of blame/culpability do you place with the motor vehicle driver?
Rating (0%-100%, 100% = complete blame)

38. How much responsibility do you feel for the accident?
Rating (0%-100%, 100% = complete responsibility)
38a. Were there weather conditions or mechanical failures that were partly responsible?
(1= Yes, 2= No, 3= N/A) _________________

*If yes, describe.....*

________________________________________

________________________________________

________________________________________

38b. How much responsibility do you attribute to these other conditions?
Rating (0%-100%, 100% = complete responsibility)

________________________________________

39. Were there any drugs or alcohol involved in the CA?
(1= Yes, 2= No)

________________________________________

39a. Were you under the influence of drugs or alcohol at the time of the CA? (1= Yes, 2= No)

________________________________________

WHAT ________________________________
40. Was the driver of the motor vehicle under the influence of drugs or alcohol at the time of the CA?  
(1= Yes, 2= No, 3= DK, 4= N/A)

WHAT

41. Were there any tickets issued? (1= Yes, 2= No) ________

42. Did you receive a ticket? (1= Yes, 2= No) ________________

43. Did the driver of the motor vehicle receive a ticket?  
(1= Yes, 2= No) ____________________________________________

43a. What was the nature of the charges?  
____________________________________________________________
____________________________________________________________

44. Aside from CA related issues, are there any other stressors going on in your life?  
(1= Yes, 2= No) _____________________

*If yes, list....
____________________________________________________________
____________________________________________________________
____________________________________________________________
45. Is there any legal action expected or underway as a result of the accident? (1= Yes, 2= No) ____________________________

Note nature of legal issues (e.g., pending, resolved, expected)...

46. Have you had any dealings with insurance agencies or Accident Compensation Commission? (1= Yes, 2= No) ____________________________

46a. Is it ongoing, pending, or resolved?

46b. Was or are there any difficulties in regard to your interactions with ACC or with insurance? (1= Yes, 2= No) ____________________________

If yes, describe....

__________________________________________________

__________________________________________________

__________________________________________________

__________________________________________________
47. How many cycling accidents have you had prior to this one?
   *If yes, describe....*

47a. How many motor vehicle accidents have you had prior to this cycling accident?
   *If yes, describe....*

48. Now that we have talked about the accident in a variety of ways, are there any last minute memories, or memories that seem more vivid, such as things you saw, heard, felt or smelled?
49. Are there any issues in relation to the CA that we have not discussed that you would like to talk about?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

50. Psychological History

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix J

Study One: Information Sheet
ADVERSE PSYCHOLOGICAL REACTIONS to a CYCLING ACCIDENT.

Information Sheet
My name is Lee Dymand, I am a clinical psychology student completing my Master’s at the University of Canterbury. My area of interest is psychological reactions to accidents, specifically accidents involving a motor vehicle and a cyclist. I am interested in finding out how cycling accidents may impact on individuals’ psychological well being.

The current study aims to investigate adverse psychological reactions to cycling accidents which have happened to people in the Christchurch area. Participants in the study will be initially asked to fill out three brief questionnaires that assess their responses to their cycling accident. They will be asked about mood, present avoidance of cycling activity, and questions about the cycling accident. Secondly, participants will be interviewed by me on one occasion for approximately one-hour. This interview will go into more detail in respect to how the participant’s cycling accident has impacted on their life. This will include the participant’s personal response to the accident as well as looking at if there is any current distress concerning road and cycle use.

In addition, participants will be asked to give approval for me to approach a significant other (e.g., partner or close family member) for further evaluation of their reaction to their accident. Their significant other will be asked to complete a brief questionnaire. This information will be interpreted along with the participant’s earlier received data.

All personal details and information about the participants as well as personal details and information given by significant others will be confidential and will be securely stored. The results of the research may be published but participants can be assured their personal records will remain confidential and their identity will never be
disclosed. Participants are free to withdraw from the study at any time and to withdraw any information given.

I can be contacted at 364-2987 (ext. 8083 or 7887) or at 384-6564 (also, email: lrd17@student.canterbury.ac.nz). I will be pleased to discuss any concerns that participants may have. The project is being supervised by Neville Blampied, Senior Lecturer of psychology.

This project has been reviewed by the University of Canterbury Human Ethics Committee.
Appendix K

Study One: Participant Consent Form
Participant Consent Form

1. I have read and understood the description of the researcher’s project in the information sheet. On this basis I agree to participate in the research project.

2. I consent to Lee Dymand writing up his findings and submitting them as his Master’s thesis to the University of Canterbury with the understanding that anonymity will be preserved.

3. I consent to Lee Dymand contacting and collecting information from my significant other (Name: __________________) in regard to the impact that my cycling accident has had on my psychological functioning.

4. I understand that I am free to withdraw from this project at any point, including withdrawal of any information I have provided.

Signed

Participant


Researcher
Appendix L

Study One: Participant’s Significant Other’s Consent Form
Participant's Significant Other's Consent Form

1. I have read and understood the description of the researcher's project in the information sheet. On this basis I agree to participate in the research project.

2. I consent to Lee Dymand writing up his findings and submitting them as his Master's thesis to the University of Canterbury with the understanding that anonymity will be preserved.

3. I understand that I am free to withdraw from this project at any point, including withdrawal of any information I have provided.

Signed

...............................  
Participant's Significant Other

...............................  
Researcher
Appendix M

Study Two: Newspaper Articles
Accident effect to be studied

by Tara Ross

Research into the effect of car accidents on children should help reduce mental distress, a University of Canterbury student says.

Clinical psychology PhD student Lee Dymand is investigating the psychological impact of car accidents, with a particular focus on children.

He is seeking families who are prepared to be interviewed for the study, which is partly funded by the Child Accident Prevention Foundation of New Zealand.

There is little research into how car accidents affect children's mental states, and a general lack of awareness of the risk of trauma after an accident, Mr Dymand said.

"Children can have trouble sleeping," he said. "They can suffer flashbacks and increased anxiety. A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children."

The nationwide study is planned to form the basis of an information pamphlet for parents, teachers, and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

Mr Dymand hopes that, with increased awareness of the problem, traumatised children will get appropriate treatment earlier and not suffer ongoing mental distress.

If children were left undiagnosed, it could affect their development, he said. "It may impact on their academic performance or on their personality. If a teacher has a child in class who's playing up, it may be that they don't actually have an aggressive behaviour problem, but they're suffering from post-traumatic stress disorder."

Early results from his work on the impact of car accidents on Christchurch cyclists suggest that about a third of cyclists involved in accidents suffer ongoing distress.

Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the last 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Children and their parents or caregivers need to be interviewed for the study.

Anyone interested in being involved in Lee Dymand's study can phone 0800 668 833 or e-mail lrd17@student.canterbury.ac.nz.

The Press (Christchurch): 04/01/01

Researcher seeks families to interview

CHRISTCHURCH - A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children.

Clinical psychology student Lee Dymand said the research could help find ways of reducing children's mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the last 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Anyone interested can phone 0800 668 833 or e-mail lrd17@student.canterbury.ac.nz.-PA

Wanganui Chronicle: 04/01/01
Researcher to focus on road accident trauma

A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children.

Clinical psychology student Lee Dymand said the research could help find ways of reducing children's mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

"A child's physical injuries are dealt with immediately after an accident, but the impact of the accident on the child's psychological well-being is often overlooked or unrecognised.

"Children can have trouble sleeping. They can suffer flashbacks and increased anxiety.

"A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children," he said.

Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the past 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Christchurch — A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children.

Clinical psychology student Lee Dymand said the research could help find ways of reducing children's mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

Mr Dymand said there was little research on how car accidents affected children psychologically.

"A child's physical injuries are dealt with immediately after an accident, but the impact of the accident on the child's psychological well-being is often overlooked or unrecognised.

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Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the past 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Both children and their parents or caregivers need to be interviewed for the study.

Anyone interested in being involved in Lee Dymand’s study can phone 0800 668-833 or e-mail lrd17student(at)canterbury.ac.nz.

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Both children and their parents or caregivers need to be interviewed for the study.

Anyone interested in being involved in Lee Dymand’s study can phone 0800 668-833 or e-mail lrd17student(at)canterbury.ac.nz.
Researcher seeks child accident survivors

CHRISTCHURCH — A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children.

Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

Mr Dymand said there was little research on how car accidents affected children psychologically.

“A child’s physical injuries are dealt with immediately after an accident, but the impact of the accident on the child’s psychological well-being is often overlooked or unrecognised. Children can have trouble sleeping. They can suffer flashbacks and increased anxiety. A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children,” he said.

Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the past 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Both children and their parents or caregivers need to be interviewed for the study.

Anyone interested in being involved in Lee Dymand’s study can phone 0800 668 833 or e-mail lrd17student@canterbury.ac.nz.

Gisborne Herald: 04/01/01

Accident research

A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children. Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

He can be contacted on 0800 668-833, or e-mail: lrd17student@canterbury.ac.nz.

Nelson Mail: 04/01/01

Crash victims sought for study

Christchurch PA

A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children.

Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

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Mr Dymand said there was little research on how car accidents affected children psychologically.

“A child’s physical injuries are dealt with immediately after an accident, but the impact of the accident on the child’s psychological well-being is often overlooked or unrecognised. Children can have trouble sleeping. They can suffer flashbacks and increased anxiety. A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children,” he said.

Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the last 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Both children and their parents or caregivers need to be interviewed for the study.

Anyone interested in being involved in Lee Dymand’s study can phone 0800 668 833 or e-mail lrd17student(at)canterbury.ac.nz.

Wairarapa Times-Age (Masterton): 04/01/01
Researcher seeks crash victims to quiz

A Canterbury University doctorate student is seeking families to interview about the psychological effects of car accidents, particularly on children. Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

Mr Dymand said there was little research on how car accidents affected children psychologically.

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Mr Dymand is seeking families with children who are aged between eight and 14 and have been in a car accident within the last 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

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Road crash effects on children studied

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Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

His study is partly funded by Child Accident Prevention Foundation of New Zealand. It will form the basis of an information pamphlet for parents, teachers and health professionals to help them become more aware of the likelihood of trauma and its symptoms.

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“Children can have trouble sleeping. They can suffer flashbacks and increased anxiety.

“A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children,” he said.

He seeks families with children who are aged between eight and 14 and have been in a car accident within the last 12 months, as a passenger, pedestrian, cyclist, or skateboarder/scooter rider.

Children and their parents or caregivers need to be interviewed.

For more details, phone 0800 668 833 or e-mail lrd17@student@canterbury.ac.nz.

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Crash trauma survey appeal

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Clinical psychology student Lee Dymand said the research could help find ways of reducing children’s mental distress after accidents.

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“A child’s physical injuries are dealt with immediately after an accident, but the impact of the accident on the child’s psychological well-being is often overlooked or unrecognised. Children can have trouble sleeping. They can suffer flashbacks and increased anxiety.

“A lot of kids have stomach aches and headaches, because the things that adults can put into words can come through physically for children,” he said.

Anyone interested in being involved in Lee Dymand’s study can phone 0800 668 833 or e-mail lrd17@student@canterbury.ac.nz. — NZPA.
The hidden trauma of childhood road accidents

Up to a third of children involved in road accidents suffer some sort of ongoing psychological distress. A student researcher intends to find out more. Helen Bain reports.

The broken bones, cuts and bruises on child accident victims are only too obvious. A nationwide study by Canterbury University psychology student Lee Dymand aims to uncover the unseen damage suffered by children involved in road accidents.

Mr Dymand, a third-year student studying for a PhD and Diploma in Clinical Psychology, says very little research has been done into the psychological effects of trauma on children.

However, what little study has been done suggests that about one-third of children involved in road accidents experience some sort of ongoing psychological distress. "There is a tendency for the physical injury — the cuts or bruises or broken bones — to be seen, but it is not widely recognised that the psychological trauma might have had quite an impact on their wellbeing," Mr Dymand says.

Psychological distress can manifest itself in a number of ways: children may have nightmares and sleeping problems, avoid road travel or find it distressing, suffer flashbacks to the accident, become socially withdrawn, depressed, irritable or angry.

These effects can cause serious setbacks to their schooling and social development, Mr Dymand says. "A child acting up or behaving aggressively in class might be related to them having been in an accident and this is the way it is coming out," he says.

The symptoms of psychological trauma can also be physical: children may suffer headaches or stomach aches.

The study will involve children aged eight to 14 who have been in a road accident in the past 12 months, and Mr Dymand hopes to include a minimum of 25 to 30 children.

They need not have actually been in a car during an accident — they may have been pedestrians, cyclists or skateboarders hit by a vehicle. Nor must they have suffered serious physical injury — just being in a crash where they witnessed others who were seriously injured or killed may be just as traumatic.

After an accident a child may be socially withdrawn, depressed, irritable or angry.

Parents of children in the study will be asked to fill out brief questionnaires assessing their child's behaviour. Mr Dymand will then visit the families and interview the children. All details will be confidential — while the results of the research will be published, the identity of participants will not be disclosed.

Mr Dymand stresses that the interview will be conducted so it causes minimum distress to the child. It takes less than an hour, parents are present throughout and the interview will stop if the child becomes upset.

However, Mr Dymand says the study may even be helpful rather than distressing for the children, giving them an opportunity to express themselves.

Last year he researched the psychological impact of road accidents involving adult cyclists in Christchurch, and many said they found talking about their accident was positive.

About a third of the cyclists experienced ongoing psychological effects from their accidents, such as not wanting to cycle again, or feeling nervous on roads, but Mr Dymand says the psychological effect on children may be quite different from that on adults.

Many children tend to keep things to themselves, so parents and teachers may not pick up on their distress, and Dymand hopes the study may make people more aware of the psychological, as well as physical, toll taken by road accidents.

The study is planned to form the basis of an information pamphlet for parents, teachers and medical professionals, and hopefully children will get appropriate treatment earlier as a result, Mr Dymand says.

The Child Road Accident Study has been reviewed by the Canterbury University ethics committee and is partly funded by the Child Accident Prevention Foundation. Anyone wanting to participate can contact Lee Dymand on 0800 668833 or 03 364 2987 ext 7193.

Dominion (Wellington): 12/01/01
Road accident stress in children is being probed in a Christchurch study to help parents and professionals to recognise the symptoms.

Ten families have been enlisted so far by University of Canterbury clinical psychology student Lee Dymand for his PhD thesis. He says the lack of material on the subject is surprising.

"Anxiety, sleeplessness or a fixation with road safety may point to road accident trauma," he said. Being ultra-wary of road travel could be a distress signal.

"What adults can put into words, children are more likely to experience as physical symptoms such as stomach aches and headaches."

Mr Dymand hopes that by early recognition of the root cause, distressed children can receive the help they need to deal with the emotional pain.

He is seeking a further 10 children aged between eight and 16.

By ANNA PRICE

who have been in a road accident in the last two years.

If the child was unconscious at the time, he or she would be suitable for research only if unconscious for less than 15 minutes.

Parents or caregivers will be asked to fill out two questionnaires to assess their child's current behaviour and their demeanour over the previous six months.

Research results may be published, but identities would not be disclosed, Mr Dymand said.

The project, supervised by senior lecturer in psychology Neville Blampied, has been approved by the University of Canterbury Human Ethics Committee.

Lee Dymand can be contacted on 0690-66-88-33, (03) 364-2387 (ext 7193) or email: lrd17@student.canterbury.ac.nz

The Mail (Christchurch): 15/02/01
Research study looking for children

Participants are being sought for a nationwide research study of the effect of psychological distress in children who have experienced a road accident.

Clinical psychology PhD student Lee Dymand is looking for children aged between eight and 16 who have experienced a car accident within the past two years.

Mr Dymand said little research existed into how road accidents affected children and there was a general lack of awareness of the associated trauma.

"A road accident is the most common form of trauma and if left it can flow on to other parts of a child's life. Children may exhibit behavioural problems, headaches and stomach-aches, and impaired performance at school."

Mr Dymand said psychological distress could impair a child's ability to perform and their general enjoyment of life.

Mr Dymand's research, partially funded by the Child Accident Prevention Foundation of New Zealand, is aiming to increase awareness among parents, teachers and health professionals of the likelihood and symptoms of psychological trauma.

For further information about participating in Lee Dymand's study phone 0800 668 833 or (03) 364 2987 ext 7193, or e-mail lrd17@student.canterbury.ac.nz.
Appendix N

Study Two: Newspaper Advertisement
Appendix O

Study Two: General Practitioner Recruitment Poster & Letter
CHILD & ADOLESCENT ROAD ACCIDENT STUDY

Has your child been involved in a road accident during the last twenty-four months?

I am currently conducting research into the possible psychological effects, in children, after experiencing a road accident. If your child has been in a road accident (e.g., as a passenger, cyclist, pedestrian, skateboarder/scooter, etc.), is aged between 8 – 16 years, and you are interested in becoming involved in this study, then please contact:

Lee Dymand, University of Canterbury:
Ph. 0800 66 88 33
Email: lrd17@student.canterbury.ac.nz

THIS PROJECT HAS BEEN APPROVED BY THE UNIVERSITY OF CANTERBURY HUMAN ETHICS COMMITTEE
15th January, 2001

To Whom It May Concern:

I am a postgraduate clinical psychology student at the University of Canterbury. I am currently researching psychological reactions in children (aged 8-16 yr.) following a road accident within the past 24 months. This research, which will form part of my doctoral thesis, is partly funded by the Child Accident Prevention Foundation of New Zealand. Further, it has been approved by the University of Canterbury Human Ethics Committee and the Department of Psychology.

I am writing to ask if you would place a recruitment poster in your outpatient waiting room. Finding participants for this nation-wide study has been difficult and I would appreciate any help you could provide. I have included a poster and some information sheets for display. If you have any queries about my research or myself, please feel free to contact me at the above numbers. Alternatively, you can contact my supervisor Neville Blampied (Senior Lecturer in Psychology; 364-2987 ext. 6199).

Yours sincerely,

Lee Dymand
Appendix P

Study Two: Additional Interview Questions
Additional Questions

1. Did you suffer physical injuries from the accident? (Yes/No)
   Nature of: ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   Loss of consciousness? (Yes/No) ______ minutes

   Very minor  = no medical attention
   Minor       = requires first aid
   Moderate    = visit to medical centre
   Severe      = hospital admission (Note, how long – days)
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

1a. What have your physical injuries been like since the accident?
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

2. At the time of the accident did you feel or think you were in danger? (Yes/No)

3. Did you feel or think you might die? (Yes/No)
4. At the moment how nervous or afraid do you feel when you are in a car? (1 – 10, 10 = very/really scared)

5. At the moment how nervous or afraid do you feel when you are on your bike (&/or scooter, skateboard)?
   (1 – 10, 10 = very/really scared)

6. At the moment how nervous or afraid do you feel when you are walking on the footpath or when you are near a road?
   (1 – 10, 10 = very/really scared)

7. Are there any other times you feel nervous or afraid?
   Where/When ____________________________________________
   (1 – 10, 10 = very/really scared)

8. Is there anything about the accident or how you have been feeling lately that we have not talked about and you would like to talk about?

   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________

9. Any significant past life events? (including past accidents)

   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
10. Psychological Hx. (of child)


11. Psychological Hx. (of family)


Appendix Q

Study Two: Participant Instruction Sheet
Dear Participant(s),

Firstly, thanks for taking part in this research project. Enclosed with this letter are a number of forms. It is important that you read the ‘Information Sheet’ first. Following this, please sign the ‘Consent Form(s)’ if you agree to take part in this study. Please contact me if you decide you do not want to take part in this research. Next, the parent/caregiver needs to complete the two enclosed questionnaires. When filling out the ‘Parent Report of the Child’s Reaction to Stress’, please read the directions carefully. When filling out the ‘Child Behavior Checklist’, please do so independently from anyone else, including your child. Please answer all the questions on both questionnaires.

If you are unsure about something, please feel free to call me or we can discuss it when we meet. By now, we may have already set up a time for me to meet with you and your child. If this has not been arranged then I will be in touch with you in the next few days. When we meet, I will collect the enclosed forms from you. Thank you again for your interest in this project, it is appreciated.

Yours sincerely,

Lee Dymand
Appendix R

Study Two: Information Sheet
CHILD & ADOLESCENT ROAD ACCIDENT STUDY

Information Sheet

My name is Lee Dymand, I am a psychology student at the University of Canterbury completing my Ph.D. and Diploma in Clinical Psychology. My area of interest is psychological reactions to accidents, specifically road accidents involving a child/adolescent. I am interested in finding out how road accidents may impact on a child’s psychological well being.

The current study aims to find out about psychological distress in children and adolescents who have experienced a road accident. This research project is looking for children aged between eight and sixteen years old who have experienced a road accident within the past twenty-four months. If the child was unconscious at the time of the accident, he or she would only be suitable for this research if the period of unconsciousness was less than fifteen minutes. Parents/Caregivers will be initially asked to fill out two questionnaires that assess their child’s current behaviour and their behaviour over the past six months. These questionnaires will be mailed out.

Secondly, I will travel to the home of the parents/caregivers and their child/adolescent. At this time, the child will be asked to fill out a short questionnaire in regard to their accident. This questionnaire assesses how the child has been feeling since their accident, it gives them a chance to say what influence the accident has had on them. At this time I will interview the child, this will include the child’s personal response to the accident as well as asking about any current distress concerning road use. Parents/Caregivers are free to be present during this interview. Whilst there is some possibility that the questions may be upsetting, every effort will be made to prevent this from occurring. Further, if there is any indication that the child is becoming distressed the interview will cease.

All personal details and information about the child, as well as personal details and information given by their parent/caregiver will be confidential and will be securely stored. The results of the research may be published but parents/caregivers can be assured their personal records and their child’s personal records will remain
confidential and their identity will never be disclosed. Participants are free to withdraw from the study at any time and to withdraw any information given.

I can be contacted at 0800 66 88 33 or (03) 364-2987 (ext. 7193) (also, email: lrd17@student.canterbury.ac.nz). I will be pleased to discuss any concerns that participants may have. The project is being supervised by Neville Blampied, Senior Lecturer in psychology.

This project has been reviewed by the University of Canterbury Human Ethics Committee and is partly funded by the Child Accident Prevention Foundation of New Zealand.
Appendix S

Study Two: Parent/Caregiver Participant Consent Form
Parent/Caregiver
Participant Consent Form

1. I have read and understood the description of the researcher’s project in the information sheet. On this basis I agree to participate in the research project. Further, I consent to Lee Dymand gathering information from my child (Child’s Name: ___________).

2. I consent to Lee Dymand writing up his findings and publishing them as part of his Ph.D. thesis, and in other professional publications, with the understanding that anonymity will be preserved.

3. I understand that I am free to withdraw from this project at any point, including withdrawal of any information gathered from my child or myself.

Signed

........................................ Date:
Participant

........................................ Date:
Researcher
Appendix T

Study Two: Child/Adolescent Consent Form (10 years old and above)
Child/Adolescent Consent Form
(10 years old and above)

1. I ________________ (Name) have talked with my parent(s) about the study that Lee Dymand wants to do about my recent accident. I understand that I will have to answer some questions about the accident. I agree to take part in the study. I agree that Lee Dymand can ask me about the accident.

2. I understand that I can stop taking part in this study at anytime and that I can ask to have anything back that I have told or written to Lee Dymand.

Signed

_____________________________ Date:
Child

_____________________________ Date:
Researcher
Appendix U

Study Two: Adolescent Consent Form (15 years old and above)
Adolescent (15 yr. and older)
Participant Consent Form

1. I ___________ (Name) have read and understood the description of the researcher’s project in the information sheet. On this basis, I agree to participate in the research project. Further, I consent to Lee Dymand gathering information from my parent/caregiver (Parent/Caregiver’s Name: ___________).

2. I consent to Lee Dymand writing up his findings and publishing them as part of his Ph.D. thesis, and in other professional publications, with the understanding that anonymity will be preserved.

3. I understand that I am free to withdraw from this project at any point, including withdrawal of any information gathered from my parent/caregiver or myself.

Signed

............................................ Date:
Participant

............................................ Date:
Researcher