PSYCHIATRIC MORBIDITY FOLLOWING

ROAD TRAFFIC ACCIDENTS

by

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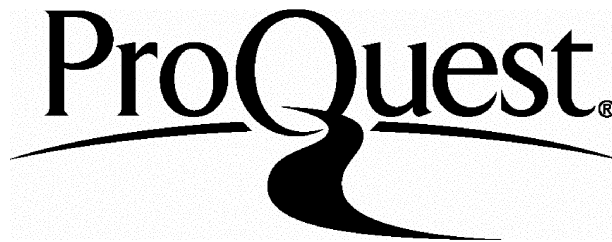
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ABSTRACT

Objectives: To examine psychiatric morbidity, in particular Post-traumatic Stress Disorder (PTSD) in road traffic accident victims.

Design: Prospective, longitudinal one year follow up study of two groups of victims differentiated on severity of event by admission to hospital, one group admitted, one not admitted.

Setting: Accident and Emergency Department of North Tees General Hospital, serving a mixed urban and rural population of 177,299.

Subjects: 80 general road accident victims presenting at Accident and Emergency who resided in North Tees Health District. 30 consecutive admissions to hospital and 50 randomly recruited, not admitted, aged 18 - 65, not involved in a fatal accident nor receiving significant head injury.

Main Measure: PTSD.

Subsidiary Measures: Psychiatric disorder, depression, anxiety and symptoms related to accident circumstances.

Results: At least one fifth of subjects suffered PTSD during the year following the accident. Just over one third of those admitted to hospital and approximately one eighth of those not admitted to hospital so suffered. Most improved over time but one twentieth pursued a chronic course. Other psychological consequences sometimes occurred, either co-morbid with PTSD or independently. At least one third suffered psychiatric disorder. This was not synonymous with PTSD but was present in just over half PTSD cases. Depression occurred in approximately one fifth of the total sample and anxiety symptoms in one tenth. One fifth suffered accident related phobias. Admission to hospital and higher Impact of Event scores were predictive of developing PTSD. Accident related symptomatology was not influenced by seeking compensation.

Conclusions: Road traffic accidents are common events as is the development of PTSD after such an accident. PTSD is more likely to develop the more severe the event, but can occur after a relatively minor accident and may become chronic. Other psychological consequences can occur. The cost to the individual and society is great. More research and prevention strategies are required.

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I also wish to record my gratitude to Mr. R. Blizard, medical statistician, for his statistical advice, patience and guidance throughout the statistical aspects of this research.

I owe also a debt of gratitude to the patients who participated in this study and to my consultant colleagues for allowing me access to patients under their care.

My thanks also go to my husband, Malcolm, who encouraged me to write this thesis and sustained me throughout my endeavours.

DECLARATION

The concept for this thesis arose from my own interest and experience in this subject. All the work presented in this thesis is entirely my own and does not form part of any other research or thesis. All aspects of this thesis have been undertaken personally.

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CHAPTER ONE   INTRODUCTION

1.1: INTRODUCTION

The psychiatric morbidity addressed in this thesis is Post-traumatic Stress Disorder (PTSD). This is a condition which consists of a typical constellation of symptoms that occur after exposure to a traumatic event. The symptoms are characterised by intrusive recollections of the trauma, avoidance of trauma related events and anxiety.

PTSD was first officially recognised in 1980 (APA, 1980). However, it is not a new condition and has been present throughout the ages. People have responded in the same way to disasters and catastrophes and such responses have been documented since 2000 B.C. The ways in which the condition has been received by society and the importance accorded to it has varied. It has been called by many different names which reflect the ideologies of the time. (See Table 1.1). Interest in the condition has been stimulated at times of war, particularly the Vietnam War, and major disasters. The recent series of major disasters in the U.K., such as the Herald of Free Enterprise, King's Cross Fire, Hillsborough, Piper Alpha and Lockerbie have been influential in the acceptance and understanding of this condition, not only by the medical and legal professions, but also by the general public.

While it is now generally accepted that wars and major disasters can have psychological consequences, scant attention has been paid to the psychological consequences of common daily events such as road traffic accidents. Whereas the psychosocial consequences of major accidents are recognised, individual smaller accidents have less impact on society. However, there may be disastrous effects upon the individual involved in such accidents. Even minor accidents can have quite disruptive psychosocial effects on health, occupational, social, family and financial aspects of life. The cumulative cost to society and the health services from minor

accidents must be considerable. There has been a recent proliferation of research in the area of Post-traumatic Stress. (See Table 1.2). The majority of this research has been directed towards the effects of wars, crimes and disasters. There is a paucity of research directed towards the psychosocial consequences of road traffic accidents. A recent Editorial in the British Journal of Psychiatry (Di Gallo and Parry-Jones,1996) drew attention to this lack and the need for more research on this topic.

This study documents psychiatric morbidity, in particular PTSD, following road traffic accidents. It examines factors that might be of predictive value. It documents contact with litigious procedures. It is hoped that this will contribute to the body of research and towards establishing prevention strategies for the psychological consequences of road traffic accidents.

A review of the literature that is relevant to this study follows. It addresses the issues of PTSD regarding an adult population. It does not explore the issues of a child and adolescent population nor treatment aspects. The review falls into two parts. Firstly, the literature on PTSD in general is reviewed. This covers the history, epidemiology, natural course, co-morbidity of other post-traumatic consequences and the relationship between litigation and PTSD. Secondly, the literature relating specifically to PTSD and road traffic accidents is reviewed. The chapter ends by outlining the aims and hypotheses to be addressed by this thesis.

1.2: REVIEW OF THE LITERATURE ON POST-TRAUMATIC STRESS DISORDER

1.2.1: HISTORY OF POST-TRAUMATIC STRESS DISORDER

There are many recordings of what would currently be termed PTSD in the historical literature, across many different cultures, wherever there are records of human behaviour and wars or tragedies. Reports of hysterical reactions were published

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by the ancient Egyptian physicians in 1900 B.C. in one of the first medical textbooks, Kunyus Papyrus (Figley, 1993). Accounts are to be found in the Epic of Gilgamesh, Homer's Iliad and Cicero's Letters to His Friends. Samuel Pepys records his reaction to the Great Fire of London in his diary on September 25 - 26, 1666, page 296 ....."and all night still mightily troubled in my sleep with fire and houses pulling down"...(ed. Latham and Matthews, 1970 - 83).

Post-traumatic conditions attracted the attention of the medical profession in the Nineteenth Century. Da Costa (1871), a Philadelphia physician presented a classic paper on "irritable heart". He observed more than 300 cases of cardiac malady in soldiers from the American Civil War. He described symptoms of palpitations, cardiac pains and nervous disorders which were common among invalided soldiers. He gave his name to the syndrome. John Erichsen (1875), Professor of Surgery at University College Hospital, published a series of fourteen lectures on "Concussion of the spine, nervous shock and other obscure injuries of the nervous system in their clinical and medico-legal aspects". They incorporated his six lectures written in 1866 on "Certain obscure injuries of the nervous system commonly met with as the result of shocks to the body received in collisions on railways". He propounded that even slight injuries to the nervous system resulted in damage to the spinal cord and membranes, producing physical and emotional symptoms. These changes could happen in any accidents but were more frequent in those subjected to the violent shock of a railway collision. He used the terms "railway shock", "railway collision", and spinal concussion". Indeed the condition is often referred to as "Erichsen's Disease". His view was challenged by Herbert Page (1882), Surgeon to London and North-West Railway. Page published a book "Injuries of the spine and spinal cord without apparent mechanical lesion" discounting the concept of "railway spine" after studying 234 cases related to collision. He found no evidence that the spinal cord suffered "concussion" in the absence of simultaneous injury to the spinal cord and introduced the concept of "nervous shock" - that the symptoms were essentially psychological in origin. Walton (1883) added to

the debate by directing attention to the brain suggesting that the brain rather than the spinal cord was a more likely seat of disturbance, considering both physiological and anatomical relationships.

Psychoanalytical interpretations added to the picture. In the 1880's Jean-Martin Charcot documented case histories of what he termed "traumatic hysteria", which today would be known as the psychoneurology of trauma. He proposed a dual model of a hereditary diathesis or constitutional predilection to nervous degeneration and an environmental agent provocateur (Micale, 1994). Sigmund Freud (1916 - 1917) in his "Introductory Lectures to Psychoanalysis" considered that traumatic neuroses were not in essence the same thing as spontaneous neuroses but showed that ..."a clear indication to the fixation to the moment of traumatic accident lies at their root"... They appeared before the war also, after railway collisions and other alarming accidents involving fatal risks. In his "Introductory Lectures to Psychoanalysis and the War Neuroses" (1917 - 1919), Freud considered that war neuroses were traumatic neuroses which also occurred in peace time after frightening experiences or severe accidents, without any reference to a conflict in the ego, and that the soil which nourished them appeared to be the national army, that there was no possibility of them arising in an army of professional soldiers or mercenaries. Later (1920), he announced a new definition of trauma as a break-through of the defence against stimuli and abreaction of the anxiety by constant repetition. He considered that the individual oscillated between two psychic responses, an intrusive phase, where an attempt was made to repeat the trauma and a numbing phase, where an attempt was made to avoid recollections of the trauma.

World War 1 focused attention on soldiers and interest was revived in "Irritable Heart". Lewis (1917) described "Effort Syndrome" found in soldiers and for which no physical cause was found. The symptoms present were breathlessness, pain, exhaustion, giddiness and fainting, palpitations, headache, lassitude, coldness and

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sweating, irritability of temper, sleeplessness and inability to fix attention. Oppenheimer and Rothschild (1918) drew attention to the psychoneurotic factor in the "irritable heart" of soldiers. They considered that there were two groups of cases, one a constitutional group suffering chest pains and one where nervous symptoms were prominent. Mott (1918) described two war psycho-neuroses, hysteria and neurasthenia. He considered that war psycho-neuroses did not differ from those met with in civil life except that they were coloured and determined by war experiences and the emotion of fear with its instinctive reaction for self preservation. He described soldiers under his care who had ...." no recollection of dreams but woke up in a cold sweat or felt dejected, some shouted in their sleep, some of them were mute and a good few have gone through all the process of fighting with bombs, rifle or bayonet and yet have no recollection of the pantomime of war which they have been enacting in their sleep."..... "Shell shock" was used to describe these soldiers' condition.

World War II again focused attention on the condition. Wood (1941) reached the conclusion that the symptoms and signs of Da Costa's syndrome more closely resembled those of emotion, especially fear, than those of effort in the normal subject. Lewis (1942) examined the incidence of neurosis in England under war conditions. He noted that at that time the Ministry of Pensions had to deal with ...." Shock originating from direct exposure to bomb explosions or blast - a loose term covering neurotic reactions as well as physical injury. " Grinker and Spiegel (1945) examined 64 case histories of American Air Force personnel from among those with war neuroses repatriated from overseas and combat veterans returning home for relief from flying or for rehabilitation. They considered that under sufficient stress any individual may show failure of adaptation, evidenced by neurotic symptoms. They described symptoms of vomiting and diarrhoea, anxiety, regression and hysterical conversion syndrome. They also described "Operational Fatigue" in returnees, a euphemism by which war neuroses were designated in the Army Air Force. They were able to identify a wide range of symptoms existing in every possible combination and degree, both subjective and

objective, including excessive or deficient sympathetic activity. They included restlessness, irritability and aggressive behaviour, fatigue, startle reaction, tension, depression, personality changes, preoccupation with combat experiences, nightmares and battle dreams and psychosomatic symptoms.

Kardiner (1959) considered that although a war situation could revive pre-existing syndromes that had been dormant, it could also create new ones. No one exposed to war experience came away without some of the symptoms of the traumatic syndrome however temporary they were. He identified five features in the traumatic syndrome, an altered concept of oneself in relation to the outer world, a typical dream life of catastrophic dreams, irritability and startle pattern, proclivity to explosive aggressive reaction patterns and contraction of general level of functioning. Kardiner pointed out that although there was much data about the condition controversy about the subject remained ....."the literature can only be characterised as anarchic. Every author has his own frame of reference"......

World War II created much psychiatric morbidity which, together with the interest and increased knowledge, was responsible in the U.S.A. for the recognition and inclusion of the condition as a psychiatric category in DSM 1 (APA, 1952) codified as Gross Stress Reaction in the group of Transient Situational Personality Disorders. (See Appendix 1). It involved exposure to ......" Severe physical demands or extreme stress, such as in combat or in civilian catastrophe ......" and stated that ......
" in many instances this diagnosis applies to previously more or less "......" normal persons who experience intolerable stress "...... This was revised in DSM11 (APA 1968), (see Appendix 2). The condition was reclassified into a category of ......" Adjustment Reaction of Adult Life " and gave as an example ....."Fear associated with military combat and manifested by trembling, running and hiding". Its appendix did give additional examples of stressful events such as motor vehicle accidents and other transport accidents.

The Vietnam War in 1972 was influential in bringing about the official recognition of PTSD. There was much morbidity following that war and in addition civilian disasters occurred in the U.S.A. such as the Buffalo Creek Dam Collapse. It became clear that the DSM11 classification was grossly inadequate to address the situation. Horowitz (1976) influenced the scene with his work on Stress Response Syndromes. He developed his "general theory" - an explanation of the phases of denial and intrusion, the two extremes of response to stressful life events, and general treatment principles. He pointed out the inadequacy of the then current classification and terminology, a view shared by others ..."the main difficulty lies with the lack of clear phenomonological demarcation between different kinds of stress response".... He identified the following four responses:- (i) The immediate acute pattern which correlated with Gross Stress Reaction (DSM1) and Transient Situational Disturbances (DSM11). (ii) The subacute or chronic which correlated with Traumatic Neurosis.

(iii) The precipitation of latent and idiosyncratic psychological conflicts which correlated with the Psychoneuroses that followed trauma. (iv) The changes in personality which correlated with Special Syndromes. There developed an understanding that impairment followed extreme adversity and was a distinct and separate condition. It was officially recognised and included in the category for anxiety disorders in DSM111 (APA, 1980) as a distinct diagnostic entity under Post Traumatic Stress Disorder (see Appendix 3). For the first time operational criteria were drawn up . There had to be a ...." recognisable stressor that would evoke significant symptoms of distress in almost everyone ".... and symptoms must be present from three groups (i) re-experiencing the trauma (ii) numbing of responsiveness (iii) symptoms not present before the trauma. Provision was made for a chronic or delayed subtype.

Further research and clinical knowledge became available and the diagnostic criteria for PTSD were revised and refined in 1987 - DSM111R (APA, 1987), (See Appendix 4). The stressor was defined as ...." an event outside the range of usual human experience and that would be markedly distressing to almost anyone ".... Three

groups of symptom clusters were identified (i) Re-experiencing the trauma (ii) avoidance (iii) increased arousal. Symptom clusters (ii) and (iii) must not have been present before the event. The duration of symptoms must have been present for at least one month. Provision was made for the delayed onset PTSD.

Recent events such as The Falklands and Gulf War and major disasters have been influential in turning attention towards this condition in the U.K. Table 1.3 at the end of this chapter details some recent events and some of the researchers involved. In 1992, for the first time, the World Health Organisation included a diagnostic category for PTSD in the Tenth Revision of the International Classification and Related Health Categories. It is included in the category for neurotic, stress-related and somatoform disorders under reaction to severe stress, and adjustment disorders. There is a clinical and research version with clinical guidelines and operational criteria laid down. The stressor was defined as an event of ....." an exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone ". There must be symptoms of re-experiencing the trauma. Other symptoms may be present in the clinical version but symptoms of avoidance, and either amnesia or increased arousal must be present in the research version. A delayed onset may be specified. (See Appendices 5 and 6).

There was a further revision of the American classificatory system in 1994 - DSMIV (APA, 1994), (see Appendix 7). PTSD remains in the category for anxiety disorders. Emphasis has shifted from the severity of the stressor to a mixture of (i) exposure to a traumatic stressor and (ii) the patient's reaction to it....." actual or threatened bodily harm to oneself or to others ....have responded to it with intense fear, helplessness or horror ". Thus, the subject's perception of the threat is included in addition to the objectivity of the stressor. This allows the inclusion of individuals who have demonstrated extreme reactions to minor trauma (Pilowsky, 1992) as well as those who have indirectly experienced minor trauma to others.

Attention has turned to PTSD in fields other than wars and disasters. Research has been undertaken on survivors of crime, rape, child abuse, the Holocaust, hi-jack victims, Vietnamese immigrants and torture.

PTSD has evolved, through a turbulent history. There has been much controversy about the condition. The concept of PTSD has varied and reflects the ideologies of the time. All have a common delineated typical set of symptoms following exposure to trauma. The concept has moved from that of an organic condition to that of a psychological one. The existence of PTSD has been questioned and the possibility of lack of moral fibre and malingering raised. Consideration has been given to the part played by constitutional factors and the previous personality. The concept has moved from being considered a transient condition to acceptance that a more prolonged condition can occur. Attention has focused on the primacy of the stressor, but the emphasis has now shifted to include the subject's perception of the trauma. It has now reached official recognition with its own independent status in two of the world's main classificatory systems.

1.2.2: EPIDEMIOLOGY OF POST-TRAUMATIC STRESS DISORDER

There are few epidemiological studies of PTSD in the general population. There are many of PTSD in victims of war, crime, sexual assault and residents of communities exposed to disasters. All the studies are difficult to evaluate because of the different methods of assessment of PTSD applied to different types of trauma at different time points post event. The results are not, therefore, comparable. Of the population studies that do exist, lifetime prevalence rates vary from 1% to 9.2%. The prevalence of PTSD varies considerably across studies when applied to specific populations.

Heltzer *et al.*, (1987) examined a general population of 2493 people and found the prevalence of a history of PTSD was 1% in the total population, about 3.5% in civilians exposed to physical attack and in Vietnam veterans who were not wounded, and 20% in veterans wounded in Vietnam.

Breslau *et al.*, (1991) examined an urban population of 1007 young adults from a large health maintenance organisation in Detroit. They found the lifetime prevalence of exposure to traumatic events that would fulfil the stressor criterion for DSM111R was 39.1%. The rate of PTSD in those exposed was 23.6% yielding a lifetime prevalence in the sample of 9.2%. With one exception the rate of PTSD varied slightly and not significantly across types of event. Sudden injury or serious accident had a lower rate (11.6%) than physical assault (22.6%), seeing someone killed or seriously hurt (23.6%), news of sudden death or accident of a close relative or friend (21.1%) or threat to life (24%). A markedly higher rate (80%) was observed in women who reported rape. They concluded that with the exception of rape more than 75% of those exposed to typical PTSD events were unaffected by the disorder.

Davidson *et al.*,(1991) studied PTSD in North Carolina. They found that among 2985 subjects the lifetime and six months' prevalence figures for PTSD were 1.3 and 0.44% respectively. Norris (1992) examined the frequency and impact of ten potentially traumatic events in a sample of 1000 adults. Over their lifetimes 67% of the sample had experienced at least one of the events. She found that PTSD ranged from 2% - 14% depending upon the nature of the event experienced. The current prevalence of PTSD was in the range 7% - 11% among persons who had been exposed to violent crimes, death or accidents and in the range of 5% - 8% among persons who had been exposed to various environmental hazards.

Kessler *et al.*, (1995) examined 5877 persons between 15 and 54 years of age in the National Co-morbidity Survey and found the estimated lifetime prevalence of PTSD was 7.8%. They found that the trauma most commonly associated with PTSD differed for men and women. For men the trauma was combat exposure and witnessing whereas for women it was rape and sexual molestation.

The prevalence of PTSD in specific populations varies considerably, depending upon the population and the time of assessment post trauma. Table 1.4 at the end of this chapter demonstrates some examples. The studies relating to accidental injuries, and road traffic accidents will be considered separately in the second part of the literature review.

1.2.3: <u>CO-MORBIDITY AND POST-TRAUMATIC STRESS DISORDER</u>

Psychological consequences, other than PTSD, have been documented following exposure to a traumatic event. These consequences may take the form of co-morbidity with PTSD or may stand alone. Researchers have demonstrated a whole range of psychiatric disorders following various traumatic events in various populations.

Population surveys have identified co-morbidity with PTSD. Researchers have identified rates of co-morbid psychiatric disorder of 44% to 88% in those subjects with PTSD in the populations examined. A variety of disorders have been identified although depression appeared to be common across surveys.

Heltzer *et al.*, (1987) examined a general population of 2493 people and found that 80% of those with PTSD also had a co-morbid condition, frequently obsessive compulsive neurosis and depression. Breslau *et al.*, (1991) examined an urban population of 1007 adults and reported that 44% of those with PTSD also had a co-morbid condition. They found a stronger association with anxiety and affective disorder (37% co-morbid depression) than with substance abuse or dependency. Davidson *et al.*, (1991) in their community survey found PTSD to be significantly associated with diagnoses of somatization disorder, schizophrenia, panic disorder, social phobia, obsessive compulsive disorder, drug abuse, major depression, agoraphobia, simple phobia and generalised anxiety. Kessler *et al.*, (1995) in their National Co-morbidity

Survey also found that PTSD was strongly co-morbid with other lifetime DSM111R disorders. A lifetime history of at least one other disorder was present in 88% of men and 79% of women with lifetime PTSD.

Samples of Vietnam Veterans have revealed high rates of co-morbidity with PTSD. Rates identified have varied from 56% to 94%. It was not uncommon to have more than one co-morbid condition. Substance abuse and depression were commonly present. Sierles *et al.*, (1983) identified 56% of their sample of 25 hospitalised combat veterans met the criteria for an additional diagnosis while 8% did so for three additional diagnoses. The co-morbid syndromes included substance abuse, anti-social personality disorder, somatisation disorder, endogenous depression and organic mental syndrome. Pitman (1989) examined subjects with musculo skeletal injuries. Only 7% of twenty-seven PTSD subjects had PTSD as sole diagnosis. Other diagnoses were alcohol dependence or abuse (67%) drug abuse (30%) major depression (63%) and panic (26%) with other anxiety disorders being found frequently. Kean and Wolfe (1990) identified over three quarters of their sample of 50 Vietnam veterans with PTSD also met criteria for at least one other diagnosis, the overall average number of diagnoses per subject being 3.8, including PTSD. The most common co-existing diagnoses in their study were substance abuse (84%), major depression (68%) and personality disorders (26%). Green *et al.*, (1992) compared a community sample of disaster survivors with a community sample of Vietnam veterans. They found that less than 6% of individuals in each group had PTSD alone. The most common concurrent diagnoses with PTSD were major depression, phobic disorder and generalised anxiety disorder.

Other various populations have also revealed co-morbid conditions with PTSD. Scott *et al.*, (1995) found high chronic morbidity and associated co-morbidity in 56% of their sample of 25 community litigants following the Lockerbie Disaster. The most frequent diagnoses were PTSD and depression followed by other anxiety

disorders. Skodol *et al.*, (1996) found that other psychiatric disorders were more frequent in young Israeli men exposed to combat who developed PTSD than in those who did not. The most frequent disorders were major depressive disorder, substance misuse disorder and personality disorders.

The literature examined reveals that it is not uncommon to have co-morbid disorders with PTSD. Substance abuse appeared to be common among populations of Vietnam veterans and depression common in other populations. The studies relating to accidental injury and road traffic accidents will be considered separately in the second part of the literature review.

1.2.4: NATURAL HISTORY OF POST-TRAUMATIC STRESS DISORDER

While few studies have specifically addressed the issue of the natural history of PTSD, many have studied the rate of PTSD in various samples at various time points. It has been possible to obtain some information about the natural course of PTSD from these studies.

Blank (1993) reviewed thirty studies evaluating the manifestations of PTSD over time. The duration of the studies varied from ten and a half months to forty years. The trauma varied from wars, to crime, to national disasters. He concluded that PTSD often persisted over time, or occurred long after the trauma, especially if trauma had been prolonged and complex such as prisoner of war incarceration. He concluded that there were multiple variations in the natural history of PTSD, acute, delayed, chronic, intermittent, residual and reactivated patterns. The studies reviewed included those of Kulka *et al.*, (1990) who found a rate of 15% PTSD in Vietnam veterans approximately nineteen years on average after war zone traumatic stress, Goldstein *et al.*, (1987) who found a current prevalence of 50% and Kluznick *et al.*, (1986) who found a current prevalence of 47% in former World War II prisoners of war

approximately forty years after combat and prison camp confinement. They also included McFarlane's (1986) study on bushfire fighters. He found that 14% of a community sample of disaster survivors showed PTSD at twenty-nine months follow up. McFarlane (1986) in his study also demonstrated delayed emergence of PTSD and the resolution of chronic cases. At eleven months post trauma, PTSD had emerged in forty-one cases and had resolved in fifty-nine. At twenty-nine months PTSD had emerged in another fifty-two cases but had resolved in another thirty-five. Only 53% of those who showed PTSD at four months also showed it at twenty-nine months. There was evidence of chronic, recurrent and delayed onset.

Many other studies show similar findings. Kessler *et al.*, (1995) in the National Co-morbidity Survey found that one third of persons with PTSD never fully remit even after many years irrespective of whether they were receiving treatment or not. Curran *et al* (1990) found that some Enniskillen bombing survivors thought to have recovered showed an emergence of symptoms at one year. Scott *et al.*, (1995) in their sample of twenty-five community litigants following the Lockerbie disaster found that in the 56% demonstrating chronic morbidity the most frequent diagnoses were PTSD and depression. Only six cases were found to have " recovered " and there was only one case of delayed onset morbidity between twelve and thirty six months.

The literature demonstrated many variations for the course of PTSD. It might be acute, delayed or intermittent. It is not unusual for chronic cases to persist over time.

1.2.5:   **LITIGATION AND POST-TRAUMATIC STRESS DISORDER**

There has been much debate and controversy about the relationship of post traumatic sequelae and litigation. The debate centres around the issue of whether symptoms are genuine or are exaggerated by anticipated compensation. It dates as far

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back as the conflict between Erichsen (1875) and Page (1883) as detailed in Section 1.2.1. Erichsen included chapters on medico-legal aspects of injuries of the spine in his book. The main protagonists this century were Miller and Kelly but many others joined the debate. It is not practical to present all the contributors to this debate but the main, influential contributions to the literature are reviewed.

Miller (1961) in his Milroy Lectures drew attention to this issue when he examined 200 cases of head injury referred for medico-legal examination between 1953 and 1957. In his papers on Accident Neurosis at those lectures he concluded that compensation proceedings were important in perpetuating post traumatic symptoms and that, like its causation, the prevention of accident neurosis could realistically be conceived only in social terms. His view predominated for many years but was subsequently challenged by other researchers. Kelly (1972) examined 152 patients referred following head injury of all types of severity. He refuted four myths then commonly accepted. They were that:- (i) No-one ever recovered and returned to work before settlement. (ii) Post Traumatic Syndrome never occurred in patients injured in a situation in which there was no possibility of obtaining compensation or pension. (iii) Post Traumatic Syndrome never followed severe head injury and that the severity of the symptoms was in inverse proportion to the severity of the injury. (iv) Post Traumatic Syndrome never occurred in patients of managerial or professional classes. However, Woodyard (1980) analysed 584 patients referred for report for compensation. He found that in compensation claimants a large number had trivial injuries and showed a delayed return to work. He suggested there must be some other factor - an attitude of mind perhaps - that induced the semi-skilled to claim compensation more frequently than the skilled or unskilled. In 1981 Kelly undertook further studies to supplement the findings of his 1972 study He confirmed that patients suffering from post traumatic syndrome after direct head injury do recover from this syndrome and return to work before litigation was settled. Failure to return to work by the time of settlement indicated a bad prognosis. Mendleson added to the debate. In

his 1981 study of 101 patients referred for psychiatric evaluation or treatment after motor car or industrial accident he found that all were working at the time of the injury and all were involved in litigation, but 67% of patients failed to return to work at follow up 16 months after conclusion of their compensation claim. Mendleson (1982) reviewed the literature on the effect of legal settlement of compensation claims on disability and return to gainful employment. He found that the literature did not support the view that patients inevitably became symptom free and resumed work within months of the finalisation of their claims. Up to 75% of those injured in compensable accidents might fail to return to gainful employment two years after legal settlement.

Thompson (1982) pointed out that Miller's views were based on experience of around 4000 patients whilst Kelly's were based on the records of over 800 patients and so it was disappointing that no solution emerged on this baffling medico-legal problem facing the courts. Weighill (1983) reviewed the literature on compensation neurosis. He pointed out that the incidence of psychological difficulties across the whole range of cases was unknown and identified a major research need for more adequate screening and sampling of cases.

Tarsh and Royston (1985) examined 35 claimants with back or limb injuries with accident neurosis in which there were gross perplexing somatic symptoms without demonstrable organic pathology one to seven years after compensation was received. They found that few claimants recovered and any such recovery was unrelated to the time of compensation. Over protection by relatives appeared to be an important factor in prolonging the symptoms. In 1987 Mendleson examined 126 patients, 71 involved in personal litigation and presenting with low back pain and 37 who were not entitled to compensation and not involved in litigation. His findings did not support the assertion that patients with chronic pain claiming compensation described illness behaviour that was significantly more "abnormal" than that described by comparable groups of patients not entitled to compensation. He pointed to the then

currently accepted view supported by published literature that litigants were not " cured by a verdict ".

Lishman (1988) reviewed physiogenesis and psychogenesis in the "Post Concussional Syndrome". He concluded that where mild to moderate injuries are concerned, organic factors are clinically relevant in the earlier stages, whereas long-continued symptoms are perpetuated by secondary neurotic developments, often of a complex nature. Burstein (1989) found no significant differences were noted on such treatment variables as dropout rate and outcome when patients with PTSD after motor vehicle accidents involved in seeking financial compensation for damages resulting from the accident were compared with those who developed PTSD after a sudden loss and who had no possibility of being compensated. He suggested that the possibility of financial compensation did not affect the course of the disorder. Hoffman (1991) assessed 101 litigants who were suing for emotional damages. He found that severe emotional problems and disability were common among litigants. The causes of their suffering were more complex and less poorly understood. Seventy per-cent had evidence of continuing physical injuries to account for the physical and emotional symptoms. The most common diagnosis was psychiatric condition affecting physical illness. Binder, Trimble and McNeil (1991) in their study on accident victims with psychological symptoms who were involved in litigation, suggested that there was a better outcome the longer the time after resolution of the litigation and the shorter the time between injury and litigation and hypothesised that the litigation process itself maintained or exacerbated psychological symptoms. Cornes (1992) studied 521 injured survivors of road accidents who were in employment when injured and who submitted personal injury claims. He suggested that return to work was less associated with clinical variables than with variables such as time off work, absence of psychological problems and younger age and suggested more effective rehabilitation might require new approaches to clinical case management in orthopaedic departments. Fenton *et al.*, (1993) studied 45 patients admitted to hospital with mild

head injury. They found that 39% of the group were diagnosed as psychiatric cases at six weeks after the injury, that the emergence and persistence of post concussional syndrome was associated with social adversity before the accident, and that while young men were most at risk of minor head injury, older women were most at risk of chronic sequelae.

In 1995 Mendleson again reviewed the concept of compensation neurosis and follow up studies of claimants after compensation following the finalisation of their legal proceedings. A follow up of 760 litigants found that of 264 subjects who were not working at the time of conclusion of litigation and who could be traced, 75% were not working after an average of 23 months following the finalisation of their cases. Mayou (1995) reviewed issues on compensation and psychological sequelae. He studied those seeking compensation for the consequences of injuries arising from road traffic accidents for three years after the accident. His findings showed that psychological and social consequences were in many ways similar to other major physical problems but in addition specific post traumatic sequelae were prominent. He concluded that much of the published evidence on compensation in relation to road accidents and other accident injury was based on small atypical sub-samples. These studies had a wholly disproportionate effect on the views of medical experts, lawyers and on those seeking compensation in general. A small proportion of subjects fabricate accounts of distress and disability and others deliberately exaggerate. However, what might appear to the outsider to be disproportionate distress and disability should be seen as within the range of individual response to an unpleasant event and injury in a manner that was no different to the range of reactions to a heart attack, a diagnosis of cancer or other physical disorder. Terms such as exaggeration, simulation or malingering were rarely appropriate.

Despite all evidence to the contrary, Miller's view has remained influential in the courts and has been much quoted by lawyers until recent years. It is therefore of interest to see that in 1995 the Law Commission produced a Consultation Paper on " Liability for Psychiatric Illness ". This included a section under the Medical Background on PTSD. There is an interesting review of the subject including reference to Mayou *et al*'s recent studies on road traffic accidents. Consultees were invited to express views on (a) whether the summary of the relevant medical background, research and conclusions was fair and accurate and if not why not, and (b) what they believed to be the incidence of psychiatric illnesses caused by injury to, or fear for the safety of, others and as to whether a survey could sensibly be carried out on that specific issue and (c) any other medical considerations they believed should be taken into account

Slovenko (1994) examined the American courts and the legal aspects of PTSD. He concluded that the courts have significantly relaxed restrictions and are now admitting novel evidence of psychological trauma. He commented on the difficulty in evaluating syndromes and quoted law professor Daniel Shuman's argument that the profession of psychiatry has an obligation to assist the courts in accurately evaluating the various syndromes, including PTSD otherwise psychiatry may well suffer a loss of credibility and the judicial system a loss of accuracy. Neal (1994) drew attention to the pitfalls of making a categorical diagnosis of PTSD in personal injury litigation and pointed out the legal and ethical issues involved in assessing and interpreting the DSM criteria which might lead the expert witness to make authoritative pronouncements outside his legitimate field of expertise.

Pugh and Trimble (1993) raised the question of nervous shock and who shall be compensated and in what circumstance in relation to psychiatric injury after Hillsborough. McCulloch *et al.*, (1995) examined the development of the legal concept of nervous shock representing a compromise of the need to compensate those suffering psychiatric damage and the need to protect a defendant from unlimited

liability. He noted that the criteria that have developed to achieve this balance are arbitrary and take little account of psychological or physiological knowledge about PTSD. He suggested that recent developments in scientific understanding of this condition could usefully inform the legal process and that some aspects of the dilemma could be avoided now that psychiatric diagnosis was becoming more effective.

It is interesting to note the amount of damages awarded for PTSD. In Practitioner Quantum of Damages extracted from Halisbury's Laws Service Monthly Bulletin the total damages awarded in November 1994 to a plaintiff involved in a road traffic accident was £13210 for bruising, whiplash injury to cervical spine, injury to thoracic and lumbar spine, and psychological shock (which aggravated her angina). The judge noted that she was suffering moderate/severe PTSD and awarded £4250 of the general damages in respect of this (Harris, 1995).

1.3 : REVIEW OF THE LITERATURE ON POST-TRAUMATIC STRESS DISORDER AND ROAD TRAFFIC ACCIDENTS

Road traffic accidents are common events. In 1994 there were 234,000 such accidents in the U.K. (Department of Transport,1995). These resulted in 3,650 deaths, 1,124 of which were pedestrians. There were 315,189 road accident casualties of all severity of injury, 47,000 of which were of serious injury. An accident is defined by the Department of Transport as one involving personal injury occurring on a public highway, in which a road vehicle is involved and which becomes known to the police within thirty days of its occurrence.

This is not a new problem. In 1926 there were 124,000 accidents resulting in 4,886 deaths and 134,000 injured. In 1966 292,000 accidents, 7,985 deaths and 384,000 injured were recorded. In 1980 the figures were 252,000 accidents, 6,010 deaths and 323,000 injuries and in 1990 258,000 accidents, 5,217 deaths and 336,000 injured.

Raffle (1991) examined the cost of traffic casualties in the community and quoted the Department of Transport estimation of the total costs to society of road traffic accidents in 1989 to be £6,360 million of which £5,040 million was attributable to personal injury accidents, the rest to damage only accidents. Little evidence exists on the social and medical costs of disability arising from road traffic accidents. Even minor accidents can have quite disruptive psychosocial effects in health, occupational, social, family and financial aspects of life. The cost to society and the Health Services must be great. The Department of Health produced a consultative document for Health in England (" Health of The Nation, 1991 ") highlighting the prevention of accidents, the objective being to reduce the number and severity of accident injuries. Issues to be examined included what indicators (of death and injury) could be used, targets and how far forward such targets should aim.

Despite this, there are few studies available on PTSD in relation to road traffic accidents. It is difficult to compare those that are available because of the lack of consensus between studies in instruments used for measuring PTSD, time of assessment and the way in which the results have been presented. Some are case studies (Wilson *et al.*, 1965), some retrospective (Goldberg and Gara, 1990, Green *et al.*, 1993), others are not specific and deal with accidental injuries (Culpan and Taylor 1973, Tarsh and Roystan 1985, Jones and Riley 1987, Malt 1988, Feinstein and Dolan 1991 and Shalev *et al.*, 1996). Of those which are specific, some involve populations that sought treatment (Kuch *et al.*,1985, Burstein 1989, and Blanchard *et al.*,1994 and 1995) or who were referred by solicitors (Culpan and Taylor 1973, Tarsh and Royston 1985 and Jones and Riley 1987). Some samples were of hospitalised subjects (Malt 1988, Feinstein and Dolan 1991) whereas some might or might not have been hospitalised (Blanchard *et al.*,1995, Mayou *et al.*,1993).

Nevertheless, it is a beginning and researchers are now turning their attention to this group. The earlier studies are related more to litigation and reflect the thinking of the time, with consideration being given to the issue of "malingering". The later

studies are concerned more with the epidemiology of PTSD, with attention to co-morbidity (mainly depression, anxiety and effects on driving), natural history and predictive factors for PTSD. The reported rates of PTSD in the literature, following accidents, including road traffic accidents, varies across studies from 1% to 100%.

Modlin (1960) examined 40 patients with traumatic neurosis who had been exposed to industrial and automobile accidents. He found that one third of the sample presented a picture suggestive of fundamental, non specific reactions with symptoms of anxiety, chronic muscular tension, repetitive dreams, irritability and withdrawal. He drew attention to the appearance of incapacitating psychic sequelae to accidents when little or no physical injury was sustained. He commented that although this was not a medical diagnosis it was accorded a diagnostic value in litigation. Wilson *et al.*, (1965) described and discussed the psychiatric complications that may arise as a result of trauma inflicted by automobiles. They addressed physiologically and anatomically determined dysfunctions, neurotic disorders, malingering and affective disorders and concluded that epilepsy, delirium and chronic organic reactions follow injury to the brain. They considered that neurosis, affective disorders and malingering were associated with real or fancied emotional trauma. Culpan and Taylor (1973) examined psychiatric disorders following road traffic accidents and industrial injuries in a population referred by solicitors for psychiatric evaluation following injury. Almost half of the sample was involved in road traffic accidents. They found that approximately one third of the group was disabled by neurotic symptoms which appeared to result from emotional stress of the accident and were classed as " traumatic neurosis " and of those 6% were frank malingerers. They highlighted the need for recognition of the fact that neurotic disorders were being perpetuated by secondary gain factors. Thorson (1973) examined the long-term effects of traffic accidents on patients discharged from hospital. He found that 57% were suffering from some sort of after effect of the original injury five years after the accident. Long term psychological effects of injuries such as anxieties due to disfiguring scars,

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irritation and reactions to continuous pain were suffered by 7%. Social effects such as costs not covered by insurance were suffered by 18%.

In the early 1980's attention was focused on the effect of accidents on driving behaviour and on risk factors for accidents. Munjack (1984) examined patients with driving phobia and found that 20% were precipitated by a collision and 10% by other frightening experiences in automobiles. Kuch *et al.*, (1985) examined 30 subjects referred for treatment or reports. All had PTSD. They found a high rate (77%) exhibited driving phobia. Kuch *et al.*, undertook a further study in this area in 1994 when they examined 55 survivors of road traffic accidents with minimum injury who had been referred for treatment of chronic pain at least two years post accident. They found that 38% suffered accident phobias and 38% of those suffered from PTSD. Jones and Riley (1987) examined 327 victims of industrial or motorcar accidents involved in civil accident litigation. They found that a precise psychiatric diagnosis was applicable in only a minority of subjects although psychiatric symptoms including pain, anxiety and depression were prominent. They identified four groups of accident victims, stoic, depressive, phobic motor accidents and prior claimants. The phobic motor accident group comprised only about 10% of those involved in motor accidents. Tsuang *et al.*, (1985) examined risk factors for accidents and identified personality characteristics such as low tolerance of tension, immaturity, personality disorders and paranoid conditions, drugs and alcohol.

Some of the later studies involved accidental injury but were not restricted to road traffic accidents. Malt (1988) examined the long-term psychological consequences of accidental injury in 107 accident victims. Forty-six per-cent of his sample were road traffic accidents. He found 1% of PTSD at six months but none at final follow up (mean twenty-eight months). Feinstein and Dolan (1991) examined psychopathology in forty-eight subjects exposed to physical trauma. Thirty-six per-cent of their sample were road traffic accidents. They found 27% of PTSD at six

weeks and 18% at six months. Shalev *et al.*, (1996) examined trauma victims, 53% of which were road traffic accidents and found 26% of PTSD at six months. All these studies applied to victims who were hospitalised. Malt also examined psychological consequences other than PTSD and found 17% of his sample had a non-organic psychiatric disorder during follow up. Feinstein and Dolan found that 63% of their sample proved to be psychiatric cases within the first week, although this figure dropped to 25% at six weeks and 20% at six months. All three studies examined the role of predictive factors for PTSD. They did not find any predictive value for trauma severity. Feinstein and Dolan were also unable to find predictive value in perceived threat to life at the time of the accident. Both Feinstein and Dolan and Shalev *et al.*, found the Impact of Events Scale to be of predictive value. Pilowsky (1992) drew attention to the fact that accidents are the major cause of PTSD in civilian life and described three cases of "cryptotrauma" so called because of their hidden nature. He considered that psychological trauma is often not apparent.

As stated, few studies apply specifically to road traffic accident victims. Those that do apply, draw attention to the psychological consequences following road traffic accidents. Burstein (1989) described a sample of 70 motor vehicle accident victims whom he had treated and described the difficulties in identifying victims who might be suffering from PTSD. His study was based on clinical experience of seventy motor vehicle accident victims who all met DSM111 criteria for PTSD. Goldberg and Gara (1990) undertook a retrospective study on 55 subjects who were referred for psychiatric consultation in connection with civil litigation following involvement in a motor vehicle accident. They found 14.5% of PTSD fifteen months following the accident. They also found a higher ratio of depressive presentations, relative to PTSD. Brom *et al.*, (1993) examined the psychological consequences of road traffic accidents on 151 subjects. They found that about 10% of victims suffered from PTSD. De L. Horne (1993) presented seven case histories of victims of motor vehicle accidents who all suffered from long term psychological problems. He drew attention to the

importance of addressing the psychological consequences of being a road traffic accident victim. Green *et al.*, (1993) in a pilot study of 24 hospitalised subjects also drew attention to undiagnosed PTSD following motor vehicle accidents. They found that 8% suffered from PTSD at four weeks and 33% at eighteen months. They concluded that PTSD after motor vehicle accidents is an important cause of disability. Bryant and Harvey (1995) investigated 56 patients who had been hospitalised because of motor vehicle accident related injuries. Forty-one per-cent reported significant levels of psychiatric impairment twelve months post accident. They also found them to be characterised by having more pain, unemployment, substance abuse, avoidance of road transport and compensation claims. They concluded that psychological dysfunction following motor vehicle accidents appeared to be a common occurrence.

Malt *et al.*, (1993) and Andersson *et al.*, (1994) have written about the psychosocial consequences of road traffic accidents. Malt *et al.*, reported on the consequences for both patients and their relatives. Some of their sample were children. They found that 31% of adult patients suffered from psychological problems. They found a 20% activity decrease and frequent reports of long-term depressive and anxiety symptoms. They concluded that those results and the psychosocial implications for the relatives of the victims indicated that the psychiatric and the psychosocial consequences of traffic injuries are a major cause of reduced mental health in our society. Anderson *et al.*, examined eighty-four persons injured in traffic accidents with moderate to severe injuries two years after the accident. Sixty-eight percent reported physical sequelae and 57% had been or were still suffering from psychological distress after the accident.

Watts (1995) assessed 29 people who narrowly escaped death in a coach accident that killed 11 people. He found that 41% had PTSD.

Two other groups of researchers have studied the psychological consequences of road traffic accidents. They are Blanchard *et al.*, in the U.S.A., who studied self selected samples of motor vehicle accident victims and Mayou et al in the U.K., who

examined a random sample of road traffic accident victims. Hickling and Blanchard (1992) studied the psychological sequelae of motor vehicle accidents in 20 victims referred to a private practice psychologist for treatment of headache or other pain problem. Ten (50%) suffered from PTSD and 12 suffered from driving phobia. All 12 driving phobias suffered from PTSD or subsyndromal PTSD. In another study (1992) Hickling, Blanchard *et al.*, found 95% of 20 motor vehicle accident victims referred for post traumatic headache suffered psychiatric disorder and 75% PTSD. However, Blanchard, Hickling *et al* (1994) in their study of 50 victims of motor vehicle accidents found that 46% suffered from PTSD. All of this sample showed some form of driving reluctance but only one met the criteria for driving phobia, but 48% suffered current major depression. Their 1995a study of 98 victims who sought medical attention revealed that 41% suffered PTSD, but a quarter of those no longer did so six months after the first assessment. In another 1995b study they reported on 158 victims of motor vehicle accidents at 1 to 4 months post accident. They recruited by advertisement and approaching medical practitioners. The subjects might or might not have been hospitalised and were paid for their participation. They found that 39% of their subjects suffered from PTSD. They also identified that 53% of those with PTSD also met the criteria for current major depression. In 1996 they identified that 70% of this sample could be classified as developing PTSD or not on four factors, prior major depression, fear of dying in a motor vehicle accident, extent of physical injury and whether litigation was initiated. They found a significant but low level correlation between the extent of injury and development of PTSD.

Mayou *et al.* have studied victims of road traffic accidents with the Oxford Road Accident Group. In 1991, they examined the effects of road traffic accidents on driving behaviour of 418 victims of road traffic accidents admitted to hospital. One fifth of motor cyclists had stopped using a motorcycle and nearly one half of motorcycle and vehicle drivers were more cautious. After 4 - 6 years one third of respondents still suffered anxiety about the place of accident or similar situation. In 1992 Mayou drew attention to the fact that psychiatric consequences are common

following road traffic accidents and included PTSD and phobic travel anxiety. Mayou et al (1993) examined the psychiatric consequences of road traffic accidents in 188 subjects divided into three groups of car occupants, motorcycle riders and whiplash injury victims followed up for one year. Almost one fifth of the subjects suffered acute stress syndrome characterised by mood disturbance and horrific memories of the accident. Anxiety and depression usually improved over twelve months although one tenth of patients had mood disorders at one year. PTSD occurred during follow up in one tenth of patients and phobic travel anxiety as a driver or passenger was more common and frequently disabling. PTSD syndromes were not associated with a neurotic predisposition but were strongly associated with horrific memories of the accident. In 1994, Mayou and Bryant discussed the consequences for travel for this cohort of road accident victims. Concern about travel as a driver or passenger was usual and a sizeable proportion suffered severe and persistent anxiety associated with limitation of everyday life.

A recent editorial in the British Journal of Psychiatry (Di Gallo and Parry-Jones 1996) highlights that road traffic accidents are common events, but that knowledge of psychological sequelae following road traffic accidents is less than comprehensive and states that there is an unequivocal need for further research. They noted in particular that the precise nature of the relationship between the range of psychological sequelae and the severity of the accident had not been established and that the frequency of post accident psychological disturbance remained controversial. The individual differences in adverse psychological responses to road traffic accidents and the factors that influence vulnerability warrant further investigation. They also draw attention to the difficulty in comparing studies because of the different samples and assessment instruments used.

The present study by the author is the first prospective, longitudinal study to examine two groups of unselected general road traffic accident victims differentiated by the severity of the event as measured by admission to hospital. As such it goes

some way to addressing methodological problems associated with previous studies and adds to the present body of knowledge.

1 . 4 : <u>THE AIMS AND HYPOTHESES ADDRESSED BY THIS THESIS</u>

<u>AIMS OF THIS THESIS</u>

The author set out to achieve the following aims:-

1. To examine psychiatric morbidity following road traffic accidents, in particular to ascertain whether it was possible to identify a condition of Post-traumatic Stress Disorder.

2. To examine whether the severity of the event was a relevant factor in the development of such a condition.

3. To examine whether other factors might influence the development of such condition and which might be of predictive value.

4. To document contact with litigation procedures for compensation claims for personal injury sustained in the road traffic accident.

<u>HYPOTHESES</u>

In order to test the aims it was hypothesised (in the null version) that:-

1. Psychiatric morbidity, in particular PTSD, does not occur in individuals after exposure to a traumatic event, such as a road traffic accident.

2. In road traffic accidents there is no relationship between the severity of the event and the development of PTSD.

3. In road traffic accidents there is no predictive relationship between the development of PTSD and certain pre-existing, accident related or psychological factors.

4. Following a road traffic accident there is no contact with litigation procedures for compensation claims for accident related symptomatology.

TABLE 1 . 1 :

SOME PREVIOUS TERMINOLOGY FOR
POST TRAUMATIC STRESS DISORDER

YEAR	MAIN PROPONENT	TERMINOLOGY
1871	Da Costa	Irritable Heart
1866	Erichsen	Concussion of the Spine Railway Shock
1883	Page	Nervous Shock
1878/87	Charcot	Traumatic Hysteria Psychic Shock
1917	Freud	Traumatic Neuroses War Neuroses
1917	Lewis	Effort Syndrome
1918	Oppenheimer	Irritable Heart
1919	Mott	Shell Shock War Psychoneuroses
1945	Grinker & Spiegel	Combat Neurosis Operational Fatigue
1952	DSM1	Gross Stress Reaction
1968	DSM11	Adjustment Reaction of Adult Life
1980	DSM111	PTSD
1987	DSM111R	PTSD
1992	ICD10	PTSD
1994	DSMIV	PTSD

TABLE 1 . 2 :

COMPUTER SEARCH OF THE LITERATURE
(USING MEDLINE)

DATE	CODIFICATION	NUMBER OF REFERENCES	
1966 - 1975	Stress Disorders Post Traumatic Combat Disorders	215 71	Total - 286
1976 - 1979	Stress Disorders Post Traumatic Combat Disorders	51 38	Total - 89
1980 - 1985	Post Traumatic Stress Disorder Combat Disorders	388 188	Total - 576
1986 - 1991	Post Traumatic Stress Disorder Combat Disorders	1018 289	Total - 1307
1992 - 1996	Post Traumatic Stress Disorder Combat Disorders	1199 281	Total - 1480

TABLE 1 . 3 :

RECENT EVENTS INFLUENTIAL IN FOCUSING ATTENTION ON POST TRAUMATIC STRESS DISORDER IN THE U.K.

EVENT	YEAR	SOME RESEARCHERS
Falklands Conflict	1982	Jones (1987) O'Brien & Hughes (1991) Orner (1993)
Gulf War	1990	Deahl (1994)
Northern Ireland		Lougherey et al (1988) Curran et al (1990)
North Sea Oil Rig Disaster(10 U.K. personnel involved)	1980	Holen (1993)
King's Cross Fire	1987	Turner et al (1995)
Herald of Free Enterprise	1987	Joseph et al (1993)
Piper Alpha	1988	Alexander (1993)
Lockerbie	1988	Scott et al (1995)
Hillsborough	1989	Pugh & Trimble (1993)

TABLE 1 . 4 :

INCIDENCE OF POST TRAUMATIC STRESS
DISORDER IN SPECIFIC POPULATIONS

RESEARCHER	POPULATION	PREVALENCE
McFarlane (1986)	Brushfire Fighters 29 months later	14%
Green et al (1990)	Buffalo Creek Dam Collapse 1972 2 years later	44%
Resnick & Kilpatrick (1992)	Female crime victims High crime stress exposure Low crime stress exposure	35% 13%
Green et al (1992)	Disaster survivors Vietnam veterans	25% 29%
Pitman et al (1989)	Vietnam Veterans (lifetime)	40%
Sutker et al (1993)	WWI Pacific Theater Combat veterans POW 40 years later	18% 70%
Lougherey et al (1988)	Civil Violence in Northern Ireland	23%
O'Brien & Hughes (1991)	Northern Ireland	23%
	Falklands Veterans	22%
Orner (1993)	Falklands Veterans	60%
Goldstein et al (1987)	WW 11 POW 40 years later	50%
Op den Velde et al (1993)	Dutch Resistance Fighters World War 11	56%

CHAPTER TWO METHODOLOGY

2.1 : INTRODUCTION

A prospective longitudinal study was undertaken to investigate psychiatric morbidity following road traffic accidents. A cohort of adult patients who had been exposed to road traffic accidents and who presented at the Accident and Emergency Department at North Tees General Hospital was examined and followed up over the course of one year.

The patients were recruited into two groups. Group One consisted of those patients who required admission to hospital and Group Two those who did not require admission to hospital. This differentiated the two groups on the severity of the event. Those admitted to hospital were considered to be exposed to a more severe traumatic event than those who were not admitted to hospital.

2.2 : STUDY DESIGN

2.2.1 : SAMPLE SELECTION

The following criteria had to be satisfied before a patient could be deemed suitable for entry to the study.

Inclusion criteria:

  - Involvement in a road traffic accident.

  - Referral to the Accident and Emergency Department at North

   Tees General Hospital.

  - Aged between 18 - 65 years.

Exclusion criteria:

  - Travelling constraints making assessments impractical.

  - Accident with fatalities.

- Head injury requiring specialist intervention.

- Patient too ill for assessment during the first week post
accident.

Travelling constraints were such that all patients considered for recruitment resided within the North Tees Health District. (See Appendix 8). The District is a mixed urban and rural borough of approximately 76 square miles with a population in 1995 of 177,299. It includes four towns and several small villages. It has two main arteries, the A19 and A66. It is served by one District General Hospital.

It was decided to exclude patients from accidents with fatalities to avoid the complicating factor of bereavement. Patients who sustained a head injury requiring specialist intervention were also excluded to avoid complicating factors due to cerebral damage.

Consent was obtained from consultant colleagues to approach patients under their care.

Recruitment took place over the course of one year from 07.09.92 to 06.09.93, and subjects were followed up for a further year, the study being completed on 06.09.94.

An initial assessment of road traffic accident victims attending the Accident and Emergency Department over the previous year demonstrated that fewer patients were admitted to hospital than were not admitted. To match the recruitment rates to each group and avoid a possible source of bias in the study, the following measures were adopted.

Patients were recruited to Group One (admission group) on a consecutive basis, save for when the author was absent on leave.

Patients were recruited to Group Two (non-admission group) by random numbers (1 in 3). Potential recruits were allocated consecutively a record number. The record numbers were matched against a list of random numbers 1 to 9. Those identified by 3, 6 or 9 were approached for recruitment to the study.

Forms were constructed for the recording of name, address, telephone number, unit number, age and disposal of road traffic accident victims. (See Appendix 9). These were completed daily by the Accident and Emergency staff. The Department was visited daily during the week by the author and the information collected and records checked.

To increase compliance with recruitment, patients not admitted to hospital were given a handout informing them of the research project and possible impending visit by the author. These patients were contacted by telephone by the author and an appointment arranged to visit them. If there was no reply three further telephone calls were made at different times during the day and evening over the next forty-eight hours (to accommodate those who were out or who had returned to work) to prevent selection bias. If no contact had been made after this procedure the patient was deemed "unable to contact".

Where no telephone number was available, the author visited the address of the victim, and if no contact was made, left a written explanation requesting the victim to contact her within the time limit. If no reply was forthcoming the victim was deemed "unable to contact".

Group One patients were visited personally on the wards at North Tees Hospital by the author. If they had been discharged then the same procedure outlined above was adopted.

This approach identified four groups of accident victims:-

Group One - Patients admitted to hospital from the Accident and Emergency Department following a road traffic accident.

Group Two - Patients not admitted to hospital from the Accident and Emergency Department following a road traffic accident.

Group Three - Patients who refused entry to the study.

Group Four - Patients who could not be contacted.

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2.2.2: __PATIENT CONSENT__

The study was explained to the subject by the author and signed consent obtained including consent to approach an informant who had known the subject for five years. This was countersigned by the author and filed in the subject's research records.

2.2.3: __ASSESSMENTS__

All subjects were assessed at home unless they were in-patients or attending hospital clinics. They were assessed within seven days of the accident. All were asked to identify an informant who had known them for five years (a relative or close friend) who was contacted for an assessment of the subject's pre-accident personality.

Subjects and informants were interviewed personally by the author and all questionnaires completed by the author after asking the subject the appropriate questions.

Follow-up assessments were carried out at six weeks, six months and one year post accident. Six weeks was chosen as the first assessment point to allow for the development of one month's symptomatology as stipulated in the DSM111R criteria for PTSD. (See Appendix 4)

For follow-up assessments subjects were contacted by telephone and an appointment arranged for the author to visit, or if unable to contact in this way, a written appointment was sent.

The initial interview took approximately 45 minutes to complete, assessing an informant 10 minutes and subsequent interviews 30 minutes each.

(i)   Initial Assessment

Baseline data was obtained to cover four areas :- general characteristics, characteristics specific to the accident, trauma characteristics and psychological characteristics.

(ii)   Six Weeks Assessment

The same areas were covered but additional information sought regarding any factors that could have contributed to subsequent psychiatric morbidity. Further psychological rating scales were introduced to examine psychiatric morbidity.

(iii)   Six Months Assessment

The six weeks assessment was repeated. In addition information was obtained regarding any contact with the legal services.

(iii)   One Year Assessment

The six months assessment was repeated.

2.2.4:   ETHICAL APPROVAL

Ethical approval was granted for this research by North Tees Local Research Ethics Committee.

2.3:   DATA COLLECTION

Nine psychological assessment instruments were used during the course of the study. They comprised a personality assessment, three diagnostic measures for PTSD, two measures of general psychiatric disorder, two measures of current mood namely depression and anxiety and one measure of subjective response to the accident. They will be detailed further in the appropriate sections.

2.3.1:   INITIAL ASSESSMENT

Baseline data was collected to cover the four areas already identified:- General characteristics, characteristics specific to the accident, trauma characteristics and psychological characteristics.

(i)   <u>GENERAL CHARACTERISTICS</u>

The following areas were covered:-

- Age, sex, ethnicity, marital status, employment status, social class (Registrar

  General's Classification)

- Past history of road traffic accidents.

- Past psychiatric history

- Past medical history

- Family history of psychiatric illness

- Presence of major life events during the previous twelve months (work,

  marital relationship, housing, financial difficulties, bereavement, birth of a

  child, other)

- Presence of significant other person in life.

As the presence of psychiatric morbidity was to be investigated it was important to be
aware of any other potential cause for such morbidity and, therefore, past psychiatric
history and other adverse events were relevant. It was considered sufficient to record
the presence of major life events during the previous twelve months. Subjects were
also asked if they shared their lives with anyone, whether there was any other person
important to them in their lives or whether they were alone. This was to identify
support.

(ii)   <u>CHARACTERISTICS SPECIFIC TO THE ACCIDENT</u>

Information concerning the circumstances of the accident was recorded as follows, the
patient being given the choice of answers as detailed in brackets.

- Vehicle (car/bus/motor cycle/bicycle/other)

- Status (driver/passenger/pedestrian)

- Responsibility (nil/partial/total)

- Control (nil/partial/total)

- Stressfulness of event (no recall/no threat/mild/moderate/severe/life

  threatening)

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- Alcohol consumption (immediately prior to accident and number of units per week)

- Pen picture of the accident

- Specific feelings at the time of the accident.

(iii)   <u>TRAUMA CHARACTERISTICS</u>

Trauma sustained was measured as follows:-

- Admission to hospital/no admission

- List of injuries sustained

- Abbreviated Injury Scale (AIS) (Greenspan et al,1985)

- Injury Severity Score (ISS) (Greenspan et al, 1985)

- Amnesia for accident - pre and post.

Admission to hospital or not was used as a measure that differentiated the two groups on the severity of the accident event.

A list of injuries sustained was recorded and the presence of amnesia, pre or post accident noted.

The degree of physical injury sustained by the subject was recorded using the AIS. The ISS score was then calculated to obtain a numerical rating of the overall severity of injury.(See Appendix 10) These scales were chosen to give an accurate comprehensive picture of the physical trauma sustained.

<u>Abbreviated Injury Scale</u>

This scale is a single comprehensive system for rating tissue damage sustained in motor vehicle accidents.

For the purpose of scoring the body is divided into seven regions - external, head (including face), neck, thorax, abdomen and pelvic contents, spine, extremities and bony pelvis. Each region is allocated to one of six categories on severity of injury. Minor injury attracts a score of 1; moderate injury a score of 2; severe, not life

threatening injury a score of 3; severe life threatening injury a score of 4; critical injury, survival uncertain a score of 5 and maximum injury fatal a score of 6. There is also a score of 9 for unknown injuries.

The relationship between the AIS and mortality is not linear. Scores from different systems can not be added or averaged to obtain a total value. Therefore, this scale is used to determine the ISS score which measures the overall severity of injury.

Injury Severity Score

This is a numerical measure of the overall severity of injury. Mortality increases with the AIS grade of the most severe injury. However, the relationship is not linear but quadratic. Mortality increases with regular increments when plotted against the square of the AIS grade. In addition injuries in second and third body regions increase the risk of death and the quadratic relationship persists. A severity index (ISS) was, therefore, identified. This accounts for variation in the death rates associated with both severity of trauma and the number of body areas involved. The ISS is defined as the sum of the squares of the highest AIS grade in each of the three most severely injured areas. The maximum score is 75 ($5^2 + 5^2 + 5^2$). Any injury coded 6 automatically converts the ISS to 75.

A score is thus obtained for the overall severity of injury sustained by the subject.

(iv) PSYCHOLOGICAL CHARACTERISTICS

The presence of psychiatric disorder, the subject's subjective response to the accident and the subject's pre morbid personality were assessed using the following instruments.

- Standardised Assessment of Personality (SAP)(Mann *et al*, 1981)

- Impact of Events Scale (IES) (Horrowitz et al, 1979)

- Revised Clinical Interview Schedule (CISR) (Lewis and Pelosi, 1990)

- General Health Questionnaire (GHQ) (Goldberg and Hillier, 1979)

Standardised Assessment of Personality   (See Appendix 11)

This instrument detects the presence and type of personality disorder (as classified under ICD 10) in a subject, regardless of the nature of the illness. Information is obtained from an informant (relative or close friend) of at least five years standing.

The author was trained in the use of this instrument at the Institute of Psychiatry.

Eight of the assessments (five subjects from Group One and three from Group Two) were undertaken by telephone due to non availability of informant (either out of the area or working difficult hours). One assessment (from Group Two) was never completed as the subject did not return with the contact telephone number and address as promised and was unable to be contacted subsequently. This subject dropped out of the study at six weeks assessment stage.

Impact of Events Scale   (See Appendix 12)

This instrument measures current subjective distress related to a specific event. It can be used to monitor an individual's response to a particular event over a period of time. It has a 15 item scale with 4 possible responses measuring the frequency of symptoms present over the previous seven days. This provides a potential score from a minimum of 0 to a maximum of 45. The questions are designed to elicit avoidant and intrusive experiences. On this basis the instrument is divided into two sub-scales, an avoidant sub-scale and an intrusive sub-scale, each of which can be given an independent score.

It is suitable for obtaining reports of characteristic experiences for PTSD. Of particular interest in this study were the items on intrusive thoughts, thoughts at night, dreams and pictures entering the mind.

This instrument was, therefore, deemed appropriate for this study.

<u>Revised Clinical Interview Schedule.</u> (See Appendix 13)

The Clinical Interview Schedule (Goldberg et al, 1970) is widely used for assessing minor psychiatric disorders. It is a standardised measure of neurotic symptoms. The revised version has been introduced to increase the standardisation of the interview so that it is no longer necessary for an experienced clinician to administer the interview.

Subjects are asked about symptoms occurring over the previous seven days. Each section is rated on a 0 - 4 scale except for depressive ideas which scores 0 - 5. Scoring is effected by adding all the scores which gives a potential score of 0 - 57. The recommended threshold score for cases/non cases is 11/12, 12 or more being a case. The threshold determined for case definition corresponds roughly to the point at which a G.P. would become concerned about a patient's health.

The section on somatic symptoms, fatigue and worry about physical health might allow for the subject's physical symptoms to influence the CISR score. However, the questions are directed at the subject's emotional state and this should reduce the possibility although not entirely eliminate it.

Of particular relevance to this study were the sections on depression, anxiety and phobias and also the onset of symptoms section which would help differentiate whether symptoms were due to the accident or pre-existing. To score on the phobic section of the CISR sufficiently to be considered in the onset of symptoms section, a subject is required to have a minimum score of two. A cut off score of two was, therefore, adopted for this item.

This instrument, therefore, seemed appropriate to the study. The author was instructed in the use of this instrument at the Institute of Psychiatry.

<u>General Health Questionnaire</u>   (See Appendix 14)

This 28 item instrument has been widely used as a screening test for detecting psychiatric disorders (84% sensitivity and 82% specificity (Goldberg and Williams, 1988)).

It detects current psychiatric disturbance and focuses on the inability to continue to carry out one's normal functions and the appearance of new symptoms of a distressing nature. It differentiates people suffering from psychiatric disorder as a general class from those who consider themselves well (Goldberg and Hillier, 1979).

It has four sub-scales A - somatic symptoms, B - anxiety and insomnia, C - social dysfunction and D - severe depression. Subjects are asked about their health over the past few weeks. The four point scale may be scored in two ways - GHQ score (area - number of symptoms) and Likert (area and intensity). It was decided to use the GHQ score as the aim was to detect psychiatric morbidity and differentiate psychiatric cases from non cases. Each sub-scale can be scored separately, the total score giving an indication of psychiatric morbidity, the threshold score being 4/5, those scoring 5 or more being designated cases.

Both CISR and GHQ detect neurotic symptoms and identify people suffering from psychiatric disorder from those who consider themselves well, differentiating them into cases and non cases. The original CIS correlated well with the GHQ (Goldberg and Hillier, 1979). However, the GHQ has four sub-scales which can be given a separate score and the CISR has sections that were of interest in this study, depression, anxiety and phobias and also other items not recorded on the GHQ e.g. presence of psychotic symptoms. It was, therefore, decided to use both scales.

2.3.2: FOLLOW UP ASSESSMENTS

(a)   Six Weeks Assessment

Relevant information was sought to cover the four areas already identified.

(i)   GENERAL CHARACTERISTICS

Information concerning any alteration in the circumstances since the previous assessment was sought. This included any adverse events, employment

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(yes/no/housewife) and the presence of a significant other person in the accident victim's life.

Again this information was sought to ascertain whether any psychiatric morbidity identified was due to the accident or to other possible causes.

(ii)   CHARACTERISTICS SPECIFIC TO THE ACCIDENT

Information was recorded on whether there had been any increase in alcohol consumption and whether the activities undertaken when the accident occurred e.g. driver/passenger, had recommenced.

(iii)   TRAUMA CHARACTERISTICS

The effect of the trauma was established by eliciting the following information, the subject having been given the choice of answers as detailed in brackets.

- Length of hospital stay.

- Attending hospital

- Attending G.P., psychiatrist, counsellor

- Accident related symptoms (physical/mental/both/no)

- Physical and mental morbidity (fully recovered/mild symptoms/moderate
                                 symptoms/severely incapacitated).

- Comments of nervousness regarding accident related activity.

- Receiving medication

Information was sought on whether the victim was receiving treatment for an emotional cause in order to ascertain any potential influence on the presence and course of symptoms.

(iv)   PSYCHOLOGICAL CHARACTERISTICS

The same psychological rating scales used at the initial assessment, other than SAP, were again applied. In addition three diagnostic measures for PTSD and two

measures of current mood, namely depression and anxiety, were introduced. They were:-

- Post-traumatic Stress Disorder Symptom Check List for

- DSM111R (Diagnostic and Statistical Manual of

Mental Disorders, American Psychiatric Association,

1987) (See Appendix 4)

- ICD 10 Clinical Version (International Classification of

Diseases 10th Edition of Chapter 5 - Classification of

Mental and Behavioural Disorders, WHO) (See

Appendix 5)

- ICD 10 Research Version (as above). (See

Appendix 6)

- Mood disorders:

- Beck Depression Inventory (BDI) (Beck *et al*, 1979)

- Speilberger State/Trait Anxiety Scale (STAI)

(Speilberger *et al*, 1970)

All three diagnostic measures for PTSD stipulate that the nature of the stressor must be of a particular severity. This criterion was disregarded for the purposes of this study. The presence of PTSD was sought, using the symptom check lists, irrespective of the severity of the accident.

Post-traumatic Stress Disorder Symptom Check List (See Appendices 15,16,17)

Symptom check lists were used to check the diagnosis of PTSD as identified in DSM111R, ICD 10 - Clinical Version and ICD 10 - Research Version. Each question is based on the symptom required in the classification and a yes/no answer obtained. Symptoms must have been present over the previous seven days. A yes/no answer for the presence of PTSD is obtained from the overall score.

The DSM111R is an American classificatory system based on a multiaxial classification. PTSD is coded under 309.89. The diagnostic criteria covers three symptom clusters - B) re-experiencing phenomena, C) avoidance phenomena and D) increased arousal. To score a diagnosis of PTSD 1 item from section B, 3 from C and 2 from D must be identified.

The ICD 10 is the classificatory system generally used in this country. For the first time, this edition introduces a category of PTSD which is coded under F.43.1. This is similar to the DSM111R but the description and diagnostic guidelines are less detailed and less restrictive. A clinical version is in use but there is a separate version with diagnostic criteria in the form of precise operational criteria - the research version.

For a diagnosis to be made using the clinical version, symptoms of repetitive intrusive recollection or re-enactment of the event must be present. Two other groups of symptoms are also identified, one of which is often present (emotional detachment, numbness of feeling and avoidance), while the other if present contributes to the diagnosis (autonomic disturbances, mood disorder and behavioural abnormalities).

For a diagnosis to be made using the research version, however, the criteria are stricter in that there are four symptom clusters, and symptoms must be present in three of these groups, one symptom re-experiencing the accident, one of avoidance and two of arousal or the presence of amnesia for the accident.

<u>Beck Depression Inventory</u>   (See Appendix 18)

This is an instrument for measuring symptoms and attitudes of depression, providing a quantitative assessment of intensity. There are 21 sets of questions with a 4 point scale to reflect severity of symptoms and attitudes over the previous week. The range of scores are 0 to 63. The Center for Cognitive Therapy guidelines for cut off scores were adopted (Beck *et al*, 1988). They are:- None or minimal depression < 10; mild to moderate depression 10 - 18; moderate to severe depression 19 - 29 and severe depression 30 - 63.

<u>Speilberger State-Trait Anxiety Inventory</u>   (See Appendix 19)

This instrument measures state and trait anxiety. It is a sensitive indicator of changes in transitory anxiety and can assess changes in anxiety over time. It comprises 20 items on each scale, the state recording how the subject feels at that moment in time and the trait how the subject generally feels. The state scores a 4 point scale of intensity and trait a 4 point scale of frequency. The possible scores range from 20 to 80 for each scale. Using the manual's norms for working adults and college students a threshold of 39 was adopted, 40 or above denoting clinical anxiety (Speilberger *et al*, 1983).

The BDI and STAI scales were introduced at this stage to ascertain the presence of anxiety and depression. This was distinct from the presence of general psychiatric morbidity identified by the administration of CISR and GHQ. They were not administered at the initial interview because of time constraints. The initial interview was already long and, as stated, psychiatric morbidity was already assessed by CISR and GHQ. Moreover, a normal period of distress was anticipated following a road traffic accident and to add to that distress by exposing the subject to prolonged assessment was undesirable and might have affected compliance with future assessments.

The PTSD symptom check lists were introduced to identify PTSD as this was one of the aims of the study. The DSM111R classification specifies that symptoms must have been present for one month so this was an appropriate stage to introduce this assessment.

Three classification systems were chosen for comparison. For the first time, ICD 10 introduced this category and it was of interest to see how this compared with the established American system. The ICD10 has a clinical version and research version. The clinical version is frequently used in civil litigation in this country and it was of interest to see how this compared with the more restrictive research version.

One subject left the area between initial and six week assessments and subsequent assessments were carried out by telephone.

(b)   **Six Months Assessment**

The same assessments as for six weeks were carried out.

In addition enquiry was made at this stage as to whether contact had been made with the legal services for a civil claim for damages and if so whether for physical and/or mental symptoms.

Three further assessments (one from Group Two and two from Group One) were carried out by telephone as two subjects were working and one found it inconvenient for the author to visit.

(c)   **One Year Assessment**

The same assessments as for six months were carried out.

All final assessments, other than one patient from Group One who had left the area were carried out in person.

See Appendix 20 for assessment schedule.

2.4 : STATISTICAL ANALYSIS

Preliminary discussions were held regarding the design of the study with Mr R. Blizard, Medical Statistician at the Department of Psychiatry, Royal Free Hospital School of Medicine.

To determine the sample size for this study it was necessary to obtain estimates of the potential effect of road traffic accidents on PTSD. Few studies were available but Malt (1988) observed a prevalence of 1% PTSD at six months and Feinstein and Dolan (1991) observed a prevalence of 27% PTSD at six weeks and 18% at six months. Both these studies were concerned only with subjects admitted to hospital after accidental injuries but neither was exclusively concerned with road traffic

accidents (46% of Malt's sample and 36% of Feinstein and Dolan's had been exposed to a road traffic accident). Nevertheless, they provided the best guide available to the potential effects of road traffic accidents.

It was assumed that the likely rate of PTSD among those subjects not admitted to hospital was likely to be 1% and among those admitted to hospital 20%.

In order to detect this size of difference between the two groups it was estimated that 50 subjects needed to be recruited into each group to achieve 80% power at the 5% level of significance.

An Epi Info programme (version 5.1) was used for recording data and preliminary analysis. Further analysis was carried out by SSPS (Statistical Package for Social Sciences)(Norusis 1992).

Descriptive statistics were used to describe the sample, namely means, standard deviation, range and frequencies.

Tests of statistical inference followed. Both parametric and non parametric tests were used where necessary to assess for the differences between the groups.

They comprised the following:-

Chi squared test (with Yates correction)

Fisher's Exact Test - two tailed, where the expected cell number was less than 5

Student's t test

One factor independent measures Anova (F statistic)

Kruskal-Wallis H

For discrete variables results were presented by frequency of occurrences by percentage and for continuous variables the results were presented as means and standard deviations.

The discrete variables were analysed using Chi squared or Fisher's Exact Test-two tailed where appropriate. Continuous variables were analysed for group difference

using student's t test, one factor independent measures Anova (F statistic) or Kruskal Wallis where appropriate.

Repeated measures of analysis of variance (Manova) were carried out where appropriate to assess for between group differences over time.

Odds Ratio was calculated with 95% Confidence Intervals and exact limits where appropriate.

A logistic regression analysis was performed using a backward stepwise method to investigate predictive factors in outcome.

For the main outcome variables of the study a significance level of 0.05 was accepted. However, there are dangers associated with multiple significance tests and spuriously significant results occur by chance (e.g. at 5% level 1 in 20 significant results will occur by chance). At times small numbers of observations were involved in this study. Consideration was given to making a conservative correction to the significance tests by using Bonnferoni correction (i.e. dividing all the significance levels by the number of tests carried out). However, in view of the number of tests involved this was considered to be prohibitive. It was decided, therefore, for practical purposes to adopt a policy that for variables other than the main outcome variables, a significance level of 0.05 would be a guide only to potential differences, and that for clear differences to be demonstrated a level of 0.01 would be adopted.

2.5 : <u>PRESENTATION OF RESULTS FOR PSYCHIATRIC MORBIDITY</u>

Cases of PTSD were chosen as the main outcome variable for psychiatric morbidity for this study. A subject was diagnosed as a case of PTSD if the criteria of DSMIIIR, ICD10 Research Version or ICD10 Clinical Version were satisfied. The variables were designated DSM, ICDR and ICDC respectively.

Subsidiary outcome variables for cases of psychiatric morbidity were those for psychiatric disorder (CISCASE and GHQCASE), depression (BDIa for depression of

moderate intensity and above and BDIb for depression of mild intensity and above), anxiety of clinical intensity (STAISCASE) and concern about accident related activity (phobias and comments of nervousness).

Subsidiary continuous outcome variables were the IES, CISR, GHQ, BDI, STAIS and STAIT.

The DSM variable for PTSD was adopted as the main outcome variable for the presentation of the results of this study for the purposes of discussion and comparison with other studies. The CISCASE and BDIb variables were chosen for the same reason.

CHAPTER THREE   RESULTS

3. 1 : INTRODUCTION

The results obtained are detailed in Tables 3.1 - 18 at the end of this chapter. .

There are four sections to the analysis.

(i)   ASSESSMENT OF BIAS

Analysis of potential bias due to recruitment or attrition was carried out using appropriate methods as detailed under the sections.

(ii)   ASSESSMENT OF CHANGES OVER TIME AND OUTCOME

This was the main part of the analysis. Repeated measures of variance were carried out to monitor changes in continuous variables and cases across time.

(iii)   PREDICTIVE FACTORS IN OUTCOME

An exploratory analysis was carried out to assess predictive factors in outcome.

(iv)   VARIABLES RELATING TO LITIGATION

An analysis of variables related to litigation was undertaken.

3.2 : ASSESSMENT OF BIAS

3.2.1 : INVESTIGATION FOR SELECTION RECRUITMENT BIAS TO THE STUDY

Table 3.1 outlines the response rates of subjects eligible for recruitment to the study.

An analysis was undertaken of baseline measures of all eligible subjects to investigate the possibility of selection recruitment bias to the study. Table 3.2 summarises the available data for those subjects. The Table is arranged by subject group.

The available data for Groups 3 and 4 was limited but covered the following areas:- Age, sex, employment status, social class, vehicle status, Abbreviated Injury Score and Injury Severity Score. Full information for all these areas was not always available.

Approximately half of the total group was male, 87 (54%), the average age was 32 years, 52 (43%) were married, 95 (68%) were employed and 55 (45%) were manual workers. Ninety-four (72%) were drivers at the time of the accident, and in 114 (85%) of the accidents the vehicle involved was a car. The median injury severity score was 1, the interquartile range being 3.

There were few differences between the groups. The Injury Severity Score was considerably higher among those subjects who were admitted to hospital (K.W. 82.5; $p < 0.001$). There was some evidence that males were more likely to be admitted to hospital and to refuse to enter the study ($X^2 = 8.0$, $p = 0.05$). However, this evidence should be viewed as indicating a guide to potential differences rather than clear differences as it only reached 0.05 level of significance. No other significant differences were identified between the four groups.

The difference between the groups for the ISS variable was an expected result and in agreement with the design of the study. Those subjects who suffered a more

severe accident and sustained a more severe injury were more likely to be admitted to hospital and be allocated to Group One. As no other significant differences were demonstrated between the four groups, it seems unlikely that there was any important degree of bias introduced during recruitment to the study by those subjects who refused entry to the study or who could not be contacted.

3.2.2: DESCRIPTION OF POPULATION ENTERING THE STUDY AND COMPARISON OF GROUPS ONE AND TWO

Baseline measures of the population entering the study were examined. Data covered four areas, general characteristics, characteristics specific to the accident circumstances, trauma characteristics and psychological characteristics.

(a) GENERAL CHARACTERISTICS

Table 3.3 summarises the results of the baseline measures of the general characteristics of the two groups entering the study. Variables already reported in Table 3.2 have been omitted except where significant differences were obtained between the two groups. Information about ethnicity was collected from subjects in these groups. It was discarded as it did not prove helpful. Only two of the sample were not white. Both were Indians, one born in Mombasa (from Group One) and the other in England (from Group Two).

Approximately half of the total group was male 42(53%). Thirty-eight (48%) had been exposed to a previous road traffic accident and 39 (49%) had experienced a major life event during the previous twelve months. Fourteen (18%) had a past psychiatric history and 31 (39%) a past medical history. Five (6%) of the group had a family history of psychiatric illness. Nearly all the group 79 (99%) identified a significant other person present in their lives.

The only difference between the groups was some evidence suggesting that males were more likely to be admitted to hospital (X^2 = 4.8; p = 0.03). However, this did not reach a significance level of 0.01 and should only be viewed as providing a guide to potential differences.

(b)　CHARACTERISTICS SPECIFIC TO THE ACCIDENT

Five accidents included more than one subject. On three occasions the same vehicle was involved. The subjects comprised a husband and wife, the sole occupants of one car, and a mother and daughter from a family of four occupants of another car. They were not admitted to hospital. Three subjects from a group of five friends were admitted to hospital from the third vehicle. This vehicle had swerved to avoid a cat and hit a wall. On two occasions different vehicles were involved in the same accident. The subjects from one accident were not admitted to hospital but comprised one of two occupants of one car and one of three occupants of the other. The other accident involved a head on collision and the sole occupants, the drivers, were both admitted to hospital.

Table 3.4 summarises the results of the baseline measures of characteristics specific to the accident. Again, variables that were previously reported in Table 3.2 have been omitted where no significant differences were obtained.

Twenty-six (33%) of the total population rated the accident as life threatening. Seventy (88%) considered that they had no control over the accident, while 8 (10%) accepted responsibility for the accident. Ten (13%) admitted consuming alcohol prior to the accident and 3 (4%) admitted an above average weekly consumption of alcohol. (Average weekly consumption of alcohol identified in men as 21 units and in women as 14 units).

There was some evidence to suggest that more patients in Group One accepted responsibility for the accident 6 (20%) compared with 2 (4%) in Group Two (Fisher's Exact Test; $p = 0.05$) and that more patients in Group One admitted to an above average weekly consumption of alcohol, 3 (10%) in Group One whereas none of Group Two so admitted (Fishers Exact Test; $p = 0.05$). As the significance levels only reached 0.05 this evidence should be viewed only as a guide to potential differences.

There was clear evidence suggesting that more subjects in Group One consumed alcohol prior to the accident. Nine (30%) in Group One admitted this whereas only 1 (2%) in Group Two so admitted (Fisher's Exact Test; p = 0.0004).

(c) TRAUMA CHARACTERISTICS

Table 3.5 summarises the results of baseline measures of the trauma characteristics for the two groups entering the study. The nature of the injuries sustained were varied. They included, among others, thirty subjects with whiplash injuries, twenty-one with various fractures and seventeen with generalised lacerations and bruises. The median injury severity score for the total population was 2, the interquartile range being 4. Five (6%) suffered pre-accident amnesia and 12 (15%) post-accident amnesia. There was clear evidence that the injury severity score was considerably higher among those subjects who were admitted to hospital (KW = 44.5, p < 0.001). Group One were also more likely to suffer from pre-accident amnesia and post-accident amnesia. Five (17%) of that group suffered pre-accident amnesia but none of Group Two (Fisher's exact test; p = 0.005). Twelve (40%) of Group One suffered post-accident amnesia but again none of Group Two so suffered (Fishers exact test; p < 0.001).

(d) PSYCHOLOGICAL CHARACTERISTICS

Table 3.6 documents the results of baseline measures of the psychological assessments.

Assessment of Pre-Accident Personality

Table 3.6 (A) summarises the data from the Standardised Assessment of Personality instrument which was used for this assessment. No data was available for one subject in Group Two.

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Sixty-eight (86%) of the total group were assessed to have normal personalities. Personality traits were identified in 4 (5%) and personality disorders in 7 (9%).

The two groups did not demonstrate any significant differences. None of the patients in Group One demonstrated any abnormal personality traits but 4 (8%) of Group Two did. All four were identified as anankastic personalities. Five (17%) of Group One demonstrated a personality disorder prior to the accident (one each of dysocial, impulsive, borderline, anxious and dependent) and 2 (4%) of Group Two (one impulsive and one anxious).

Assessment Of Victim's Subjective Response To The Accident

Table 3.6 (B) summarises the data from the Impact of Events Scale which was used for this assessment.

The majority of subjects 77 (96%) entering the study scored more than 0 on this scale. The mean score for the total sample was 14.6 (s.d. 11.2), the range being from 0 to 40. There was no significant difference between the groups. There was some evidence suggesting that more subjects in Group Two scored more than 0 on the IES (Fisher's Exact Test; $p = 0.05$) but this did not reach a significance level of 0.01. It should be noted that the majority of subjects in both groups scored more than 0 on this scale, 27 (90%) of Group One and 100% of Group Two.

Psychiatric Cases

Table 3.6 (C) summarises the data for both groups from the Revised Clinical Interview Schedule and the General Health Questionnaire. These instruments were used to detect the presence of psychiatric disorder and differentiate psychiatric cases (those suffering morbidity) from non cases (those who considered themselves well). The threshold score for case definition was 11/12 for the CISR (12 or more denoting a case) and 4/5 for the GHQ (5 or more denoting a case).

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The CISR identified 20 (25%) of the total group as psychiatric cases, the mean score being 7.8 (s.d. 8.6) from a range of 1 to 35. One subject (1%) scored 2 or more on the phobias section (a subject must have scored 2 or more on a particular symptom before that symptom could be identified in the onset of the illness section of the instrument).

.   The GHQ identified 26 (33%) of the total group as psychiatric cases, the mean score being 4.4 (s.d. 5.5). The range was from 0 to 22.

No difference was identified between the two groups.

(e)   SUMMARY

The characteristics of the population entering the study are described and the two groups compared.

The majority of the population scored more than 0 on the IES. This result was expected and indicates that the event had an impact on most subjects.

The two groups differed in that Group One (those admitted to hospital) had a statistically significant higher score on the ISS indicating more severe injuries in this group. Subjects from Group One were also more likely to have consumed alcohol prior to the accident and to have suffered pre and/or post accident amnesia. There was some suggestion that this group was also more likely to be have been male, to have accepted responsibility for the accident and to have had a higher than average weekly consumption of alcohol.

3.2.3: INVESTIGATION FOR POTENTIAL SAMPLE BIAS INTRODUCED BY THOSE SUBJECTS WHO FAILED TO COMPLETE THE STUDY

One of the symptom clusters of PTSD is avoidance phenomena. It was possible that those subjects lost to follow up had dropped out of the study because they were suffering from PTSD and were avoiding painful reminders of the accident.

An analysis was therefore undertaken to examine for any sample bias introduced by those subjects who failed to complete the study. Subjects who remained in the study were compared with those who did not, at each time point assessment- that is at six weeks, six months, and one year, using available baseline data.

The results of the analysis are detailed in Tables 3.7, 3.8 and 3.9.

(a) COMPARISON AT SIX WEEKS

Table 3.7 summarises the available data for those who remained in the study and those who failed to complete at six weeks, using available baseline data. Eleven subjects were lost to follow up, 3 from Group One and 8 from Group Two. Sixty-nine completed this assessment stage.

There were few differences between the two groups at this stage. There was some evidence suggesting that those remaining in the study at this stage were older (KW 5.2; p = 0.02), were more likely to be married (X^2 = 5.4; p = 0.02) and to have had a normal pre-accident personality (Fisher's Exact Test p = 0.03). However, this evidence did not reach a significance level of 0.01 and should be viewed only as a guide to potential differences.

(b)   <u>**COMPARISON AT SIX MONTHS**</u>

Table 3.8 summarises the available baseline data for those who completed the study at six months and those who failed to complete. Twenty five subjects (including those lost to follow up at six weeks) were lost to follow up by this stage, 10 from Group One and 15 from Group Two. Fifty-five subjects remained in the study.

There were few differences between the two groups. There was clear evidence at this stage that those lost to follow up had experienced a major life event in the twelve months prior to the study, $(X^2 = 9.2; p = 0.002)$ and that those who remained in the study were more likely to be married $(X^2 = 6.0; p = 0.01)$. There was some evidence that those who were lost to follow up were more likely not to have control over the accident (Fisher's Exact Test, $p = 0.05$), and that those who remained were more likely to have had a normal pre-accident personality (Fisher's Exact Test, $p = 0.03$).

(c)   <u>**COMPARISON AT ONE YEAR**</u>

Table 3.9 summarises the available baseline data for those who completed the study at one year and those who failed to complete (including those lost to follow up previously). Twenty eight subjects were lost to follow up at this stage, 12 from Group One and 16 from Group Two. Fifty-two subjects remained at the completion of the study.

Again, there were few differences between the groups. There was clear evidence suggesting that those who completed the study were more likely to be married $(X^2 = 9.2; p = 0.002)$, and some evidence (not reaching the significance level of 0.01) that they were more likely to be older $(F = 4.4; p = 0.04)$, and to have had a normal pre-accident personality (Fisher's Exact Test, $p = 0.03$) and a higher mean score on the IES $(F = 4.7; p = 0.03)$.

(d) SUMMARY

Most of the variables examined failed to demonstrate any differences between the groups. The only differences between those who completed the study and those who failed to complete were that at all three stages of the study there was some evidence suggesting that those who completed the study were more likely to be married. There was also some evidence at different stages suggesting that they were more likely to be older, to have had a normal pre-accident personality and a higher mean score on the IES. On one occasion only (at six months) there was evidence that those who failed to complete had experienced a major life event the previous twelve months and some evidence that they were more likely not to have had control over the accident.

It seems unlikely, therefore, that subjects were lost to follow up because they suffered avoidant phenomena of PTSD symptoms of avoidance.

On all other variables, including group membership, there appeared to be no difference between those who completed the study and those who did not. It seems unlikely, therefore, that any important degree of bias was introduced into the study by those lost to follow up.

3.3: ASSESSMENT OF CHANGES OVER TIME AND OUTCOME

3.3.1: CROSS SECTIONAL ANALYSIS OF OUTCOME VARIABLES AT EACH ASSESSMENT POINT

Analysis was carried out to identify the presence of psychiatric morbidity at each assessment stage and to compare the two groups at each stage.

A repeated measures analysis was undertaken on all major variables at the repeated time point assessments of the study - at entry, six weeks, six months and one year.

The results for the continuous variables were presented as mean scores and standard deviations while those for the discrete variables were presented as frequency of occurrences by percentage.

The continuous variables were analysed for group difference by one factor independent measures Anova using the F statistic or Kruskal Wallis where appropriate and the discrete variables by chi squared or Fisher's exact two tailed test where appropriate.

A significance level of 0.05 was adopted for these variables.

Some measures were introduced at entry to the study. These were the IES, CISR and GHQ. Further measures introduced from six weeks were PTSD, BDI and Speilberger State and Trait assessments.

PTSD was identified from DSMIIIR, ICD10 Research and Clinical Classifications. The variables were designated DSM, ICDR and ICDC respectively.

Psychiatric disorder was identified by the CISR and GHQ scored in the traditional manner. The threshold score for case definition was 11/12 for the CISR (12 or more denoting a case) and 4/5 for the GHQ (5 or more denoting a case). The variables were designated CISCASE and GHQCASE respectively. The intensity of depression was measured by the BDI. The threshold score for defining depression of above mild intensity was a score of 10 or more and that for depression of above moderate intensity a score of 19 or more. The variables were designated BDIa for

depression of moderate intensity and above and BDIb for depression of mild intensity and above. Anxiety was measured by the Speilberger Stait - Trait Anxiety Inventory. The threshold score was 39/40 (40 or more denoting anxiety amounting to a clinical disorder). The variable for state anxiety was designated STAISCASE. Concern about accident related activity was measured by the phobic section of the CISR (a score of 2 or more identifying a phobia, but only when applied to accident related phobias) and comments of nervousness regarding accident related activity, at appropriate time points.

Table 3.10 details the results for the cross sectional analysis of major variables at each assessment point.

(a)   <u>ENTRY TO THE STUDY</u>

Table 3.10 (A) details the results at entry to the study.

Psychiatric morbidity was identified on the variables analysed at entry to the study. However, no significant differences were demonstrated between the two groups on these variables.

(b)   <u>SIX WEEKS ASSESSMENT POINT</u>

Table 3.10 (B) details the results obtained at the six months assessment point.

At this stage the population had dropped to 27 for Group One (3 lost to follow up) and 42 for Group Two (8 lost to follow up).

Psychiatric morbidity was identified on all variables.

There was evidence that those subjects admitted to hospital had statistically significantly higher mean scores for the IES (F = 5.1; p = 0.03) than those subjects who were not admitted to hospital. This was because the IES scores of Group Two had dropped since entry to the study. Whereas the IES scores from Group One showed little change.

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No significant differences were demonstrated between the two groups on any of the other variables.

(c)   SIX MONTHS ASSESSMENT POINT

Table 3.10 (C) details the results obtained at the six months assessment point.

At this stage, the population had dropped further to 55, 20 for Group One (10 lost to follow up) and 35 for Group Two (15 lost to follow up).

Psychiatric morbidity was identified on all variables.

There was evidence that those patients admitted to hospital had a statistically significant higher mean score for the IES ($F = 5.5$; $p = 0.02$). There was also evidence suggesting that more people in Group One were identified as cases of psychiatric disorder using the GHQ ($X^2 = 4.4$; $p = 0.04$) and suffered from PTSD as measured by the DSM111R criteria (Fisher's exact test; $p = 0.02$). They were also more likely to have suffered accident related phobias (Fisher's exact test; $p = 0.02$) and made more comments of nervousness regarding accident related activity than those subjects in Group Two ($X^2 = 5.2$; $p = 0.02$).

(d)   ONE YEAR ASSESSMENT POINT

Table 3.10 (D) details the results obtained at one year assessment point.

The population had dropped to 52 at this stage, 18 in Group One (12 lost to follow up) and 34 in Group Two (16 lost to follow up).

Psychiatric morbidity was identified on all variables.

There was evidence that those subjects admitted to hospital had a statistically significant higher mean score for the IES ($F = 10.2$; $p = 0.02$). There was also evidence that more subjects in Group One suffered from PTSD as measured by ICD10 Clinical version criteria (Fisher's exact test; $p = 0.002$). They were also more

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likely to have made comments of nervousness regarding accident related activity than those from Group Two (Fisher's exact test; p = 0.003).

(e) **SUMMARY**

It was possible to identify psychiatric morbidity at each stage of the study. In particular, it was possible to identify PTSD at each stage of the study from the six weeks assessment point.

The accident victim's subjective response to the accident was measured by the IES. The IES mean score for the total population at entry to the study was 14.6 (from a possible maximum score of 45 and a minimum score of 0). The mean score on completion of the study was 3.6.

PTSD was identified by all three classificatory systems, DSMIIIR, ICD10 research and ICD10 clinical versions. For the total population at six weeks it ranged from 14 (20%) using DSM variable, 13 (19%) using ICDR variable to 32 (46%) using ICDC variable. At one year it was identified as 4 (8%) on DSM, 3 (6%) on ICDR and 8 (15%) on ICDC.

When the individual cases of PTSD were examined, using DSMIIIR criteria, eight cases identified at six weeks had resolved by six months. A further two cases identified at six weeks dropped out of the study thereafter. One case was present until six months but had resolved by one year. Three cases were present throughout and were still identifiable at one year, two from Group One and one from Group Two. Three cases were identified for the first time at six months assessment but resolved by one year and one appeared for the first time at one year.

Psychiatric disorder was identified in the total population using CISR and GHQ instruments. The CISR identified psychiatric disorder in 20 (25%) of the population at entry to the study and in 4 (8%) at one year, being the completion of the study. The GHQ identified 26 (33%) and 3 (6%) respectively.

Cases of psychiatric disorder also improved over time. When the individual pattern of cases of psychiatric disorder, identified by the CISR, was examined, 58% (11) of cases at entry had resolved by six weeks and a further case by one year. Two cases ran a fluctuating course, one case was chronic and two cases dropped out of the study. Eight cases appeared at six weeks, three resolved by six months and one by one year but two continued throughout the course of the study and two dropped out of the study. No new cases appeared at six months or one year.

This study found that cases of depression also improved over time. Twenty per-cent (14) of cases of mild depression and above were identified at six weeks, 11% (6) at six months and 8% (4) at one year. All cases of depression were present at six weeks. Depression had usually settled by the end of the study. Fifty-seven per-cent (8) had settled by six months. However, three chronic cases persisted throughout. In two of the latter, subjects also suffered from chronic PTSD (one from each group). In the remaining case chronic depression had possible independent contributing factors to the condition that were not accident related.

Cases of anxiety were also found to improve over time. Twelve per-cent (8) were present at six weeks, 5% (3) at six months and 2% (1) at one year. The majority were present at six weeks but had settled by six months. One case appeared at six months but then settled.

Concern about accident related activity was measured by the presence of phobias and comments of nervousness. Thirteen per-cent (9) of phobias were identified at six weeks, 15% (8) at six months and 8% (4) at one year, the end of the study. The pattern was for for the number of subjects with phobias to increase over time to six months and then resolve. Forty-eight per-cent (33) expressed comments at six weeks, 29% (16) at six months and 37% (19) at one year.

There was a general tendency for all scores in Group One to be higher than those for Group Two and for all scores to diminish over the time of the study.

No statistically significant differences were identified between the two groups by this analysis for variables identifying psychiatric morbidity upon entry to the study.

There was evidence that the two groups differed from six weeks. Those who had been admitted to hospital (Group One) remained more subjectively distressed by the accident to which they had been exposed than those who had not been admitted to hospital (Group Two). That difference remained throughout the subsequent stages of the study. Group One also demonstrated more psychiatric morbidity at six months and one year assessments. There was evidence that Group One demonstrated more cases of PTSD at six months using DSM111R criteria and at one year with ICD10 clinical version criteria. More cases of psychiatric disorder were also demonstrated by the GHQ at six months in that group. There was also evidence that Group One was more likely to suffer accident related phobias at six months and to express comments of nervousness regarding accident related activity at six months and one year.

While these results clearly demonstrated differences for psychiatric morbidity between the two groups they do not take into account individual differences at baseline nor changes over time. These changes needed to be examined in more detail. Further analysis was therefore undertaken on the main outcome continuous variables and cases over time. These analyses follow in the next four sections.

3.3.2: CASE ANALYSIS FOR MAIN OUTCOME VARIABLE FOR PSYCHIATRIC MORBIDITY - POST-TRAUMATIC STRESS DISORDER

An analysis of psychiatric morbidity by case definition for the main outcome variable, PTSD, was carried out. This identified the presence of any such morbidity and assessed any between group differences for this variable. A subject was diagnosed as a case of PTSD if the criteria of DSM111R, ICD10 Research Version or ICD10 Clinical Version were satisfied. The variables were designated DSM, ICDR and ICDC respectively. A subject was counted as denoting a case if that caseness had been identified at any time period during the study. The results were presented by frequency of occurrences by percentage as the number of cases as a proportion of the total sample. This was a conservative estimate. It did not take into account those lost to follow up who were not known to be cases. Of the 28 subjects lost to follow up over the course of the study (11 after entry, a further 14 after six weeks and 3 after six months) 4 were known to be cases of PTSD, all identified at six weeks. The study identified 17 cases of PTSD, 14 (including the 4 who subsequently dropped out of the study) at six weeks, 2 at six months and 1 at one year. It is possible that some subjects might have developed PTSD after defaulting from the study. In adopting this conservative way of addressing the issue it is accepted that this might not, therefore, fully reflect the true picture and some cases might have been omitted. However, it is known that the results obtained and presented in this way accurately reflect the minimum picture.

The DSM variable for PTSD was adopted as the main outcome variable for psychiatric morbidity for the presentation of the results of this study for the purposes of discussion and comparison with other studies.

The Chi squared statistic was used. The Odds Ratio was calculated with 95% Confidence Intervals and exact limits used where appropriate.

Table 3.11 represents the results obtained.

PTSD was identified on all three measures in both groups.

There was clear evidence that the two groups differed significantly on all three measures for PTSD. Those subjects admitted to hospital were at greater risk of developing PTSD than those subjects not admitted. Using the DSMIIIR and ICD10 research version criteria the risk was approximately four times that of those who were not admitted. (DSM - O.R. = 4.25, C.I. 1.21 - 15.38 and ICDR - O.R. - 3.86, C.I. 1.00 - 16.27) Using the ICD10 clinical version criteria the risk was approximately three times (O.R. - 2.91, C.I. 1.04 - 8.30).

Table 4.1 documents the overlap between the different classificatory systems. More diagnoses of PTSD were obtained using the ICD10 clinical version criteria. This is discussed in Section 4.4.

SUMMARY

The results of this analysis endorsed but also amplified the findings of the cross sectional analysis for PTSD variables.

PTSD was again identified in both groups during the study. Seventeen (21%) of subjects developed PTSD during the year following their exposure to a road traffic accident, 11 (37%) of those in Group One and 6 (12%) of those in Group Two. Whereas the cross sectional analysis demonstrated more cases of PTSD in Group One at six months assessment using DSMIIIR criteria and one year using ICD10 clinical version criteria, this analysis clearly demonstrated significant differences between the two groups on all three PTSD classificatory systems. More subjects from Group One suffered from PTSD during the year following their accident than from Group Two. Using the DSMIIIR criteria, those subjects who were admitted to hospital had

approximately four times the risk of developing PTSD compared with those who were not admitted to hospital.

3.3.3: CASE ANALYSIS FOR SUBSIDIARY VARIABLES FOR PSYCHIATRIC MORBIDITY

A similar analysis to that in the previous section was carried out, but applied to the subsidiary variables for psychiatric morbidity. These variables were the same as those used for case definition in Section 3.3.1. Psychiatric disorder was identified by the CISR and GHQ (variables designated CISCASE and GHQCASE respectively). The intensity of depression was identified by the BDI (variables designated BDIa for depression of moderate intensity and above and BDIb for depression of mild intensity and above). State anxiety of clinical intensity was identified by the STAIS (variable designated STAISCASE). Phobias and comments of nervousness were used for concern about accident related activity.

The CISCASE variable for psychiatric disorder and BDIb variable for the intensity of depression were adopted for the presentation of the results of this study for the purposes of discussion and comparison with other studies.

The Chi squared statistic was used. The Odds Ratio was calculated with 95% Confidence Intervals and exact limits used where appropriate.

Table 3.12 represents the results obtained.

(a)   PSYCHIATRIC DISORDER

Cases of psychiatric morbidity were identified in both groups using the CISR and GHQ. There was no significant difference between the two groups for either of these two variables.

(b) <u>**DEPRESSION**</u>

Cases of depression of moderate intensity and above were identified in both groups. When the threshold was reduced to include cases of mild intensity and above this figure rose from 10 (13%) to 15 (19%) (5 mild, 7 moderate and 3 severe). There was no significant difference between the two groups.

(c) <u>**ANXIETY**</u>

Cases of clinical anxiety were identified in both groups. There was no significant difference between the two groups.

(d) <u>**CONCERN ABOUT ACCIDENT RELATED ACTIVITY**</u>

Phobias and comments of nervousness were identified in both groups over the course of one year. Statistically significant differences were obtained between the two groups for the phobias variable. More subjects from Group One suffered from accident related phobias than from Group Two (O.R. = 6.00; C.I. 1.63 - 24.41).

(e) <u>**SUMMARY**</u>

The results of this analysis amplified the findings of the cross sectional analysis for these variables. No significant differences were demonstrated between the two groups on the variables indicating psychiatric morbidity other than PTSD over the course of one year except for phobias. Those subjects who had been admitted to hospital were more likely to suffer from accident related phobias than those not admitted to hospital.

3.3.4: RELATIONSHIP OF PTSD AND OTHER PSYCHIATRIC MORBIDITY

There was some co-morbidity of cases of PTSD with other post accident psychological consequences, as identified by psychiatric disorder, symptoms of depression and anxiety and symptoms related to accident circumstances. These are detailed in Table 3.13.

Psychiatric cases were not synonymous with PTSD but there was a measure of agreement in just over half the cases of PTSD. Of the seventeen cases of PTSD identified, subjects were also identified as psychiatric cases on nine occasions by the CISR at the same assessment time. Four other cases of PTSD had ben identified as cases at entry to the study but had resolved by six weeks when PTSD was diagnosed. One reappeared at six months assessment. The three chronic cases of PTSD were also chronic cases of psychiatric disorder over three of four possible assessment time points.

Forty-seven per-cent (8) of those subjects suffering from PTSD suffered depression of mild intensity and above and 35% (6) of moderate intensity and above. One chronic case of PTSD also suffered chronic depression. In just under half (8 - 47%) the cases of PTSD subjects were also identified as cases of psychiatric disorder and suffered depressive symptomatology.

Twenty-four per-cent (4) of cases who suffered from PTSD also suffered clinical anxiety. All were also identified as cases of psychiatric disorder by the CISR. Three had depression in addition. In the other five cases of anxiety, three were also identified as cases of psychiatric disorder and four were accompanied by depression, anxiety only being present per se on one occasion.

Of those subjects with PTSD, 47% (8) also had accident related phobias, although two occurred at different assessment time points to the presence of PTSD.

Seventy-six per-cent (13) of those with PTSD expressed comments of concern about accident related activity and 41% (7) were still so affected at the end of the study.

Possible independent or contributory causes for mood changes not related to the accident were present in five subjects with depressive symptomatology, in three when PTSD and psychiatric disorder amounting to a psychiatric case also existed. They were also identified in five cases of anxiety, in two cases when PTSD was also present and in three when it was not.

The potential influence of treatment on the presence and course of psychiatric symptoms was taken into account but did not prove to be a problem. Two subjects from Group Two were already receiving treatment for a pre-existing condition and received attention from a community psychiatric nurse (CPN) and behaviour therapist respectively. One dropped out of the study at six weeks. One subject from Group Two required antidepressant therapy by the six months assessment stage but continued to suffer from PTSD throughout the study. One subject from Group One received counselling after her return to work (she worked for the Health Advisory Service). She was designated a case of psychiatric disorder at entry to the study. One other subject attempted self harm by overdose because of problems with his girlfriend. He was referred to a CPN. He was designated a case of PTSD at six weeks but subsequently dropped out of the study.

SUMMARY

There was some co-morbidity of cases of PTSD with other post accident psychological consequences.

In just under one fifth of those subjects who suffered PTSD, psychiatric disorder, anxiety and depressive symptoms co-existed. In just under a half psychiatric

disorder and depression were present and in just over a half psychiatric disorder was present.

Just under one half of subjects who suffered PTSD also suffered accident related phobias and nearly three-quarters expressed comments of nervousness about accident related activity.

Only one subject suffered the whole range of other psychological consequences examined in addition to PTSD.

3.3.5: ANALYSIS OF CONTINUOUS OUTCOME VARIABLES ACROSS TIME

Further multivariate analysis was carried out to identify whether there were any significant changes for these variables within, and between, groups over time.

A repeated measures analysis of variance (MANOVA) was carried out for continuous variables (IES, CISR, GHQ, BDI, STAIT, STAIS) across time for those subjects who remained in the study (n = 52).

This is a variance ratio test using the F statistic. The results are presented as mean scores and standard deviations. The analysis produces three tests of significance, one to detect group differences, one to detect group changes across time, and one to detect differences between groups across time.

Tables 3.14 (A) and (B) summarise the group scores for these outcome variables across time.

All variables showed significant changes across time for both groups but there was no evidence that the two groups differed in their rate of improvement. However, a significant difference was demonstrated between the two groups for the mean IES score (F = 8.1; p = 0.006).

(a) SUMMARY

The results of this analysis endorsed and amplified the findings of the cross sectional analysis.

Psychiatric morbidity was identified at each assessment point. There was a tendency for all scores in Group One to be higher than those for Group Two and no significant differences were demonstrated between the two groups on any variable other than the IES. On this analysis there was evidence that subjects improved on all main measures over time but the two groups did not differ at the rate at which they improved. They only differed in that those subjects in Group One (who had been

admitted to hospital) remained more subjectively distressed by the accident to which

they had been exposed, than those subjects in Group Two (who had not been admitted

to hospital).

3.4: PREDICTIVE FACTORS IN OUTCOME

3.4.1: INVESTIGATION OF PREDICTIVE FACTORS IN OUTCOME

This study offered an opportunity to examine factors which might influence the development of PTSD and might be of predictive value.

The six weeks assessment stage provided an opportunity for a diagnosis of PTSD to be made (satisfying the DSM111R criteria that symptoms must be present for at least one month) and when the maximum information was available about subjects. At that stage sixty-nine subjects remained in the study. The investigation was, therefore, carried out on those sixty-nine subjects. This was an exploratory analysis on a small number of subjects. While not exhaustive, it provided an interesting aspect to the study. Seventeen cases of PTSD were identified, either existing at that time or developing subsequently in the study, and fifty two non cases.

Potential factors were identified, from past clinical experience, from consulting the literature and from experience as the study progressed.

An exploratory univariate analysis was undertaken on those potential predictive factors in outcome. Table 3 . 15 details the results.

The analysis identified three candidate variables. They were IES (total score on the Impact of Events Scale), XALCO (consumption of alcohol prior to the accident) and GRP (group designating admission to hospital or non admission to hospital).

A logistic regression analysis was then carried out on this subset of variables using a Backward Stepwise method in order to evaluate the independent contribution of each one. Table 3.16 details the results obtained by this analysis.

Two predictive factors were identified.

The Group variable was found to be a predictive factor ($p = 0.01$, O.R. $= 0.2$, 95% C.I. $0.05 - 0.69$). There was a decreased chance of becoming a case of PTSD as

one moved from Group One (those subjects who were admitted to hospital) to Group Two (those subjects who were not admitted to hospital).

The IES variable was also found to be a predictive factor ($p = 0.002$, O.R. 1.1, 95% C.I. 1.03 - 1.16). As the total score on the Impact of Events Scale increased there was an increased chance of becoming a case of PTSD.

These results are independent.

(a)   <u>SUMMARY</u>

This exploratory analysis was applied to a small number of subjects and, therefore, must be regarded as indicative rather than demonstrative. However, it did identify two predictive factors for PTSD.

Those subjects who were admitted to hospital were more likely to become cases of PTSD than those who were not admitted. The injury severity score, which as expected, was higher in those subjects admitted to hospital, was not a predictive factor.

Those subjects who were more subjectively distressed by the accident to which they had been exposed (as measured by the Impact of Events Scale) were more likely to develop PTSD than those who had not. However, the perceived threat to life at the time of the accident was not a predictive factor.

3.5 : **VARIABLES RELATING TO LITIGATION**

An analysis as documented in Section 3.3.1 was carried out to identify the presence of accident related symptoms (physical and mental morbidity) at six weeks, six months and one year. An analysis of contact with the legal services resulting in a personal injury claim for compensation for physical or mental symptoms relating to the accident was also carried out at six months and one year. The results are recorded in relation to the population at that assessment point and not to the total sample.

Table 3.17 details the results.

Accident related symptoms were identified in both groups at each assessment point. The total number of subjects identifying such symptoms dropped over the course of the year from 59 (86%) at six weeks to 24 (46%) at one year.

Subjects from both groups made contact with the legal services for the purposes of submitting a personal injury claim for physical or mental symptoms related to the accident. The majority had made contact at six months - 27 (49%). This rose to 28 (54%) at one year.

There were no statistically significant differences between the two groups, Group One (those subjects who had been admitted to hospital) and Group Two (those who had not), on either of these variables.

Further analysis was carried out to examine the presence of accident related symptoms in those who had submitted a claim and those who had not and in those whose claim had been resolved and those whose claim was ongoing.

Table 3.18 details the results.

The groups differed in that those who had submitted a claim were more likely to be still suffering accident related symptomatology at one year. This was to be expected.

However, 3 (6%) of the sample at one year continued to suffer symptoms and had the potential for submitting a claim but had not done so.

There was no significant difference for accident related symptoms between those whose claim had been resolved and those whose claim was ongoing. Four (57%) of those whose claim had been resolved continued to experience symptoms while 7 (32%) of those whose claim was ongoing were symptom free at that time.

Ten (35%) of claimants suffered from PTSD. They all continued to suffer accident related symptomatology at one year, although in just over half, 6 (60%), the PTSD had by then resolved.

SUMMARY

The number of subjects identifying accident related symptoms dropped over the course of the study although nearly half of the subjects at one year still experienced symptoms. The majority of people making contact with the legal services had done so by six months. Over half of those whose claim had been resolved still suffered symptoms and one third of those whose claim was ongoing were symptom free. All those claimants suffering from PTSD still suffered accident related symptoms but in over half the PTSD had by then resolved.

TABLE 3 . 1: <u>SUBJECTS ELIGIBLE FOR RECRUITMENT</u>

(n = 165)

<u>Group</u>	<u>number of subjects</u>	<u>%</u>
ONE (Admission Group)	30	(18)
TWO (Non Admission Group)	50	(30)
THREE (Those who refused entry to the study)	36	(22)
FOUR (Those who could not be contacted)	49	(30)

TABLE 3 . 2: BASELINE MEASURES OF ALL ELIGIBLE SUBJECTS

Variable	Group 1 (n = 30)	Group 2 (n = 50)	Group 3 (n = 36)	Group 4 (n = 49)	Total (n=165)	Statistic *	Probabil ity
Age			(n = 30)	(n = 37)	(n=147)		
mean	34.9	34	29.2	30	32.4	F	ns
s.d.	11.9	12	10.2	10.3	11.3		
range	(19,55)	(18,58)	(18,52)	(18,55)	(18,58)		
ISS			(n = 30)	(n = 35)	(n=145)		
median	6.5	1.5	1	1	1	KW	< 0.001
inter						= 82.5	
quartile	4	1	0	0	3		
range							
	n (%)	n (%)	n (%)	n (%)	n (%)		
Gender			(n = 32)	(n = 48)	(n=160)		
male	21 (70)	21 (42)	21 (66)	24 (48)	87 (54)	8.0	0.05
Married			(n = 20)	(n = 20)	(n=120)		
	12 (40)	25 (50)	7 (35)	8 (40)	52 (43)		ns
Employ ed			(n = 27)	(n = 32)	(n=139)		
	20 (67)	33 (66)	16 (59)	26 (81)	95 (68)		ns
Manual workers			(n = 17)	(n = 25)	(n=122)		
	15 (50)	19 (38)	11 (65)	10 (40)	55 (45)		ns
Vehicle			(n = 24)	(n = 30)	(n=134)		
car	22 (73)	42 (84)	22 (91)	28 (93)	114 (85)		ns
Driver			(n = 24)	(n = 27)	(n=131)		
	18 (60)	42 (84)	17 (71)	23 (85)	94 (72)		ns

*   - Statistic X^2 unless otherwise specified.
X^2 - chi squared (with Yates correction)
F   - F statistic Anova
KW - Kruskal-Wallis

TABLE 3 . 3 : <u>BASELINE MEASURES OF POPULATION ENTERING THE STUDY</u>

<u>GENERAL CHARACTERISTICS</u>

<u>Variable</u>	<u>Group 1</u> (n = 30) <u>n (%)</u>	<u>Group 2</u> (n = 50) <u>n (%)</u>	<u>Total</u> (n = 80) <u>n (%)</u>	<u>Statistic</u> (X^2 unless specified)	<u>Probability</u>
Male gender	21 (70)	21 (42)	42 (53)	4.8	0.03
Past RTA	11 (37)	27 (54)	38 (48)		ns
Past psychiatric history	7 (23)	7 (7)	14 (18)		ns
Past medical history	14 (47)	17 (34)	31 (39)		ns
Family history of psychiatric illness	1 (3)	4 (8)	5 (6)	Fisher's	ns
Life events	15 (50)	24 (48)	39 (49)		ns
Significant person in life	30 (100)	49 (98)	79 (99)	Fisher's	ns

Fisher's = Fisher's Exact Test - two tailed

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TABLE 3 . 4 : <u>BASELINE MEASURES OF POPULATION ENTERING THE STUDY</u>

<u>CHARACTERISTICS SPECIFIC TO THE ACCIDENT</u>

Variable	Group 1 (n = 30)	Group 2 (n = 50)	Total (n = 80)	Statistic (Fisher's unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)		
# Initial assessment					
	2.7 (2.7)	4.9 (34.9)	4.1 (36.7)	Z	ns
range	(1 - 7)	(1 - 8)	(1 - 8)		
	n (%)	n (%)	n (%)		
Life threatening	11 (37)	15 (30)	26 (33)	X^2	ns
No control	26 (87)	44 (88)	70 (88)		ns
Responsible for accident	6 (20)	2 (4)	8 (10)		0.05
Alcohol pre accident	9 (30)	1 (2)	10 (13)		< 0.001
Above average in-take alcohol	3 (10)	0 (0)	3 (4)		0.05

\# = Days post accident
Z = Z score

TABLE 3 . 5 : <u>BASELINE MEASURES OF POPULATION ENTERING THE STUDY</u>

<u>TRAUMA CHARACTERISTICS</u>

<u>Variable</u>	<u>Group 1</u> <u>(n = 30)</u>	<u>Group 2</u> <u>(n = 50)</u>	<u>Total</u> <u>(n = 80)</u>	<u>Statistic</u>	<u>Probability</u>
ISS					
median	6.5	1.5	2	KW = 44.5	< 0.001
inter	4	1	4		
quartile					
range	<u>n(%)</u>	<u>n (%)</u>	<u>n (%)</u>		
Pre accident amnesia	5 (17)	0 (0)	5 (6)	Fisher's	0.005
Post accident amnesia	12 (40)	0 (0)	12 (15)	Fisher's	< 0.001

TABLE 3 . 6 : BASELINE INFORMATION FOR POPULATION ENTERING THE STUDY

PSYCHOLOGICAL CHARACTERISTICS:

(A) STANDARDIZED ASSESSMENT OF PERSONALITY

Variable	Group 1 (n = 30)	Group 2 (n = 49)	Total (n = 79)	Statistic (Fisher's)	Probability
	n (%)	n (%)	n (%)		
Normal	25 (83)	43 (88)	68 (86)		ns
Trait	0 (0)	4 (8)	4 (5)		ns
Disorder	5 (17)	2 (4)	7 (9)		ns

(B) IMPACT OF EVENTS SCALE

Variable	Group 1 (n = 30)	Group 2 (n = 50)	Total (n = 80)	Statistic	Probability
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)		
Total score range	15.5 (11.4) (0 - 40)	14.1 (11.2) (3 - 37)	14.6 (11.2) (0 - 40)	F	ns
	n (%)	n (%)	n (%)		
number who scored > 0	27 (90)	50 (100)	77 (96)	Fisher's	0.05

(C) <u>**REVISED INTERVIEW SCHEDULE and GENERAL HEALTH**</u>
<u>**QUESTIONNAIRE**</u>

<u>Variable</u>	<u>Group 1</u> (n = 30)	<u>Group 2</u> (n = 50)	<u>Total</u> (n = 80)	<u>Statistic</u> (X^2 unless specified)	<u>Probability</u>
	<u>Mean (s.d.)</u>	<u>Mean (s.d.)</u>	<u>Mean (s.d.)</u>		
CISR range	7.0 (9.6) (1 - 35)	8.3 (8.1) (1 - 32)	7.8 (8.6) (1 - 35)	F	ns
GHQ range	3.6 (5.3) (0 - 14)	4.8 (5.7) (0 - 22)	4.4 (5.5) (0 - 22)	F	ns
	<u>n (%))</u>	<u>n (%)</u>	<u>n (%)</u>		
CISCASE	8 (27)	12 (24)	20 (25)		ns
Phobia	0 (0)	1 (2)	1 (1)	Fisher's	ns
GHQCASE	8 (27)	18 (36)	26 (33)		ns

TABLE 3 . 7 : COMPARISON OF THOSE WHO COMPLETED THE STUDY WITH THOSE WHO FAILED TO COMPLETE
(USING BASELINE INFORMATION)

AT SIX WEEKS

(A) GENERAL CHARACTERISTICS

Variable	Noncompleter (n = 11)	Completer (n = 69)	Statistic (X^2 unless specified)	Probability
Age				
Median	26	34	KW = 5.2	0.02
Interquartile range	5.5	22		
	n (%)	n (%)		
Group 1	3 (27)	27 (39)	Fisher's	ns
Gender males	4 (36)	38 (55)		ns
Employed	5 (45)	48 (70)	Fisher's	ns
Manual worker	5 (45)	29 (42)	Fisher's	ns
Married	1 (9)	36 (52)	5.5	0.02
Past RTA	5 (45)	33 (48)		ns
Past psych hist	2 (18)	12 (17)	Fisher's	ns
Past med hist	3 (27)	28 (41)	Fisher's	ns
FH psych ill	1 (9)	4 (6)	Fisher's	ns
Life events	7 (64)	32 (46)		ns
Significant person in life	10 (91)	69 (100)	Fisher's	ns

(B) CHARACTERISTICS SPECIFIC TO THE ACCIDENT AND TRAUMA

Variable	Noncompleter (n = 11)	Completer (n = 69)	Statistic (Fisher's unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
ISS	3.4 (3.0)	3.8 (3.3)	F	ns
	n (%)	n (%)		
Vehicle car	10 (91)	54 (78)		ns
Driver	8 (72)	46 (67)		ns
Life threatening	2 (18)	24 (35)		ns
No control	10 (91)	60 (87)		ns
Responsibility	1 (9)	7 (10)		ns

Pre accident amnesia	0 (0)	5 (7)		ns
Post accident amnesia	1 (9)	11 (16)		ns
Alcohol pre accident	2 (18)	8 (12)		ns
Above average alcohol	0 (0)	3 (4)		ns

(C)   PSYCHOLOGICAL CHARACTERISTICS

Variable	Noncompleter (n = 11)	Completer (n = 69)	Statistic (Fisher's unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
IES	8.8 (7.1)	15.5 (15.2)	F	ns
CISR	7.8 (6.6)	7.7 (8.9)	F	ns
GHQ	4.2 (4.6)	4.4 (2.1)	F	ns
	n (%)	n (%)		
SAP normal	6 (60)	62 (90)		0.03
trait	2 (20)	2 (3)		ns
disorder	2 (20)	5 (1)		ns
IES number who scored > 0	9 (82)	63 (91)		ns
CISCASE	3 (27)	17 (25)		ns
GHQCASE	4 (36)	22 (32)		ns

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TABLE 3 . 8 : **COMPARISON OF THOSE WHO COMPLETED THE STUDY**
WITH THOSE WHO FAILED TO COMPLETE
(USING BASELINE INFORMATION)

AT SIX MONTHS

(A) **GENERAL CHARACTERISTICS**

Variable	Noncompleter (n = 25)	Completer (n = 55)	Statistic (X² unless specified)	Probability
Age				
median	28	35	KW = 5.2	0 .02
interquartile range	13	24		
	n (%)	n (%)		
Group 1	10 (40)	27 (39)	Fisher's	ns
Gender males	14 (56)	38 (55)		ns
Employed	14 (56)	39 (71)		ns
Manual worker	12 (48)	22 (40)		ns
Married	6 (24)	31 (56)	6	0.01
Past RTA	14 (56)	24 (44)		ns
Past psych hist	5 (20)	9 (16)	Fisher's	ns
Past med hist	10 (40)	21 (38)		ns
FH psych ill	1 (4)	4 (7)	Fisher's	ns
Life events	18 (72)	18 (33)	9.2	0.002
Significant person in life	24 (96)	55 (100)	Fisher's	ns

(B) **CHARACTERISTICS SPECIFIC TO THE ACCIDENT AND TRAUMA**

Variable	Noncompleter (n = 25)	Completer (n = 55)	Statistic (X unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
ISS	4.0 (3.3)	3.6 (3.3)	F	ns
	n (%)	n (%)		
Vehicle car	20 (80)	44 (80)		ns
Driver	17 (68)	37 (67)		ns
Life threatening	5 (20)	21 (38)		ns
No control	25 (100)	47 (86)	Fisher's	0.05
Responsibility	5 (20)	13 (24)		ns

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Pre accident amnesia	2 (8)	3 (6)	Fisher's	ns
Post accident amnesia	3 (12)	9 (16)	Fisher's	ns
Alcohol pre accident	4 (16)	6 (11)	Fisher's	ns
Above average alcohol	1 (4)	2 (4)	Fisher's	ns

(C) PSYCHOLOGICAL CHARACTERISTICS

Variable	Noncompleter (n = 25)	Completer (n = 55)	Statistic (X² unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
IES	10 (9.8)	16.7 (11.3)	F	ns
CISR	8.2 (8.1)	7.6 (8.9)	F	ns
GHQ	4.5 (6.0)	4.3 (5.4)	F	ns
	n (%)	n (%)		
SAP normal	19 (79)	49 (89)	Fisher's	0.03
trait	2 (8)	2 (4)	Fisher's	ns
disorder	3 (12)	4 (7)	Fisher's	ns
IES number who scored > 0	20 (80)	52 (95)	Fisher's	ns
CISCASE	7 (28)	13 (24)		ns

TABLE 3 . 9 : **COMPARISON OF THOSE WHO COMPLETED THE STUDY WITH THOSE WHO FAILED TO COMPLETE** (USING BASELINE INFORMATION)

AT ONE YEAR

(A)   GENERAL CHARACTERISTICS

Variable	Noncompleter (n = 28)	Completer (n = 52)	Statistic (X^2 unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
Age	30.6 (9.3)	36.3 (12.6)	F = 4.4	0.04
	n (%)	n (%)		
Group 1	12 (43)	18 (35)		ns
Gender males	16 (57)	26 (71)		ns
Employed	16 (57)	37 (71)		ns
Manual worker	15 (54)	19 (37)		ns
Married	6 (21)	31 (60)	9.2	0.002
Past RTA	15 (54)	23 (44)		ns
Past psych hist	6 (21)	8 (15)	Fisher's	ns
Past med hist	12 (43)	19 (37)		ns
FH psych ill	1 (4)	4 (8)	Fisher's	ns
Life events	13 (46)	26 (50)		ns
Significant person in life	27 (96)	52 (100)	Fisher's	ns

(B)   CHARACTERISTICS SPECIFIC TO THE ACCIDENT AND TRAUMA

Variable	Noncompleter (n = 28)	Completer (n = 52)	Statistic (X^2 unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
ISS	4.1 (3.3)	3.6 (3.3)	F	ns
	n (%)	n (%)		
Vehicle car	21 (57)	43 (83)		ns
Driver	19 (68)	35 (67)		ns
Life threatening	6 (21)	20 (39)		ns
No control	26 (93)	47 (90)	Fisher's	ns
Responsibility	5 (20)	11 (21)		ns

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Pre accident amnesia	2 (7)	3 (6)	Fisher's	ns
Post accident amnesia	3 (11)	9 (17)	Fisher's	ns
Alcohol pre accident	6 (21)	4 (8)	Fisher's	ns
Above average alcohol	2 (7)	1 (2)	Fisher's	ns

(C)   PSYCHOLOGICAL CHARACTERISTICS

Variable	Noncompleter (n = 28)	Completer (n = 52)	Statistic (X^2 unless specified)	Probability
	Mean (s.d.)	Mean (s.d.)		
IES	11 (10.3)	11.7 (11.3)	F = 0.1	0.03
CISR	8.3 (8.1)	7.5 (8.9)	F	ns
GHQ	4.5 (5.8)	4.3 (5.5)	F	ns
	n (%)	n (%)		
SAP normal	21 (78)	47 (86)	Fisher's	0.03
trait	2 (7)	2 (4)	Fisher's	ns
disorder	4 (15)	3 (6)	Fisher's	ns
IES number who scored > 0	23 (82)	49 (94)	Fisher's	ns
CISCASE	8 (29)	15 (23)		ns

TABLE 3 . 10: <u>**CROSS SECTIONAL ANALYSIS OF OUTCOME**</u>
<u>**VARIABLES AT EACH ASSESSMENT POINT**</u>

(A) <u>**AT ENTRY TO THE STUDY**</u>

<u>Variable</u>	<u>Group1</u> <u>(n = 30)</u>	<u>Group 2</u> <u>(n = 50)</u>	<u>Total</u> <u>(n = 80)</u>	<u>Statistic</u>	<u>Probability</u>
	<u>Mean (s.d)</u>	<u>Mean (s.d.)</u>	<u>Mean (s.d.)</u>		
IES	15.5 (11.4)	14.1 (11.2)	14.6 (11.2)	F	ns
CISR	7.0 (10)	8.3 (8.1)	7.8 (8.6)	F	ns
GHQ	3.6 (5.3)	4.8 (5.7)	4.4 (5.6)	F	ns
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>		
CISCASE	8 (27)	12 (24)	20 (25)	X^2	ns
GHQCASE	8 (27)	18 (36)	26 (33)	X^2	ns

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B)   AT SIX WEEKS

Variable	Group1 (n = 27)	Group 2 (n = 42)	Total (n = 69)	Statistic	Probability
	Mean (s.d)	Mean (s.d)	Mean (s.d)		
IES	14.1 (11.2)	8.4 (9.5)	10.6 (10.5)	F = 5.1	0.03
CISR	8.6 (10.3)	6.7 (10.6)	7.4 (10.4)	F	ns
GHQ	5.5 (6.4)	4.1 (6.0)	4.6 (6.1)	F	ns
BDI	7.6 (10.8)	4.4 (8.7)	5.7 (9.5)	F	ns
STAIS	28.3 (11.9)	25.2 (9.7)	26.4 (10.7)	F	ns
STAIT	29.7 (12.3)	27.0 (12)	28.1 (12.2)	F	ns
	n (%)	n (%)	n (%)		
CISCASE	7 (26)	8 (19)	15 (22)	X^2	ns
Phobia	5 (19)	4 (10)	9 (13)	Fisher's	ns
GHQCASE	12 (44)	11 (26)	23 (33)	X^2	ns
PTSD					
- DSM	8 (30)	6 (14)	14 (20)	X^2	ns
- ICDR	8 (30)	5 (12)	13 (19)	Fisher's	ns
- ICDC	16 (59)	16 (38)	32 (46)	X^2	ns
BDIa	5 (19)	4 (10)	9 (13)	Fisher's	ns
BDIb	8 (30)	10 (23)	8 (26)	X^2	ns
STAISCase	4 (15)	4 (10)	8 (12)	Fisher's	ns
Comments nervousness	12 (44)	21 (50)	33 (48)	X^2	ns

(C) **AT SIX MONTHS**

Variable	Group1 (n = 20) Mean (s.d)	Group 2 (n = 35) Mean (s.d)	Total (n = 55) Mean (s.d)	Statistic	Probability
IES	9.4 (8.3)	4.2 (7.6)	6.1 (8.1)	F = 5.5	0.02
CISR	6.3 (7.8)	2.9 (5.8)	4.1 (6.7)	F	ns
GHQ	3.5 (4.4)	1.6 (3.3)	2.3 (3.8)	F	ns
BDI	3.8 (6.4)	1.9 (5.9)	2.6 (6.1)	F	ns
STAIS	23.8 (9.5)	23.0 (6.9)	23.3 (7.9)	F	ns
STAIT	28.1 (9.9)	23.8 (8.7)	25.4 (9.3)	F	ns
	n (%)	n (%)	n (%)		
CISCASE	4 (20)	3 (9)	7 (13)	Fisher's	ns
Phobia	6 (30)	2 (6)	8 (15)	Fisher's	0.02
GHQCASE	7 (35)	4 (11)	11 (20)	$X^2 = 4.4$	0.04
PTSD					
- DSM	5 (25)	1 (3)	6 (11)	Fisher's	0.02
- ICDR	3 (15)	2 (6)	5 (9)	Fisher's	ns
- ICDC	7 (35)	8 (23)	15 (27)	X^2	ns
BDIa	1 (5)	1 (3)	2 (4)	Fisher's	ns
BDIb	3 (15)	3 (9)	6 (11)	Fisher's	ns
STAISCase	1 (5)	2 (6)	3 (5)	Fisher's	ns
Comments Nervousness	10 (50)	6 (17)	16 (29)	$X^2 = 5.2$	0.02

(D)   <u>AT ONE YEAR</u>

<u>Variable</u>	<u>Group1</u> (n = 18) <u>Mean (s.d)</u>	<u>Group 2</u> (n = 34) <u>Mean (s.d)</u>	<u>Total</u> (n = 52) <u>Mean (s.d)</u>	<u>Statistic</u>	<u>Probability</u>
IES	7.3 (8.7)	1.6 (4.3)	3.6 (6.7)	F = 10.2	0.002
CISR	4.3 (5.3)	2.5 (7.2)	3.2 (6.6)	F	ns
GHQ	1.5 (3.4)	1.0 (4.3)	1.2 (4.0)	F	ns
BDI	2.3 (3.6)	1.9 (6.5)	2.1 (5.6)	F	ns
STAIS	21.2 (2.4)	22.1 (7.3)	21.8 (6.0)	F	ns
STAIT	24.6 (8.0) n (%)	23.0 (9.8) n (%)	23.6 (9.2) n (%)	F	ns
CISCASE	1 (6)	3 (9)	4 (8)	Fisher's	ns
Phobia	3 (17)	1 (3)	4 (8)	Fisher's	ns
GHQCASE	1 (6)	2 (6)	3 (6)	Fisher's	ns
PTSD					
- DSM	3 (17)	1 (3)	4 (8)	Fisher's	ns
- ICDR	2 (11)	1 (3)	3 (6)	Fisher's	ns
- ICDC	7 (39)	1 (3)	8 (15)	Fisher's	0.002
BDIa	0 (0)	1 (3)	1 (2)	Fisher's	ns
BDIb	1 (6)	3 (9)	4 (8)	Fisher's	ns
STAISCase	0 (0)	1 (3)	1 (2)	Fisher's	ns
Comments nervousness	12 (67)	7 (21)	19 (37	$X^2 = 8.9$	0.003

TABLE 3 . 11 : <u>CASE ANALYSIS FOR MAIN OUTCOME VARIABLE</u>

<u>POST-TRAUMATIC STRESS DISORDER</u>

<u>Variable</u>	<u>Group 1</u> (n = 30) <u>n (%)</u>	<u>Group 2</u> (n = 50) <u>n (%)</u>	<u>Total</u> (n = 80) <u>n (%)</u>	<u>Statistic</u> (X^2)	<u>Proba</u> <u>bility</u>	<u>Odds Ratio</u> (95% Confidence Interval)
PTSD - DSM	11 (37)	6 (12)	17 (21)	5.4	0.02	4.25 (1.21 - 15.38)
PTSD - ICDR	9 (30)	5 (10)	14 (18)	3.9	0.05	3.86 (1.00 - 16.27)
PTSD - ICDC	18 (60)	17 (34)	35 (44)	4.2	0.04	2.91(1.04- 8.30)

TABLE 3 . 12 : <u>CASE ANALYSIS OF SUBSIDIARY VARIABLES</u>
<u>FOR PSYCHIATRIC MORBIDITY</u>

<u>Variable</u>	<u>Group 1</u> (n = 30) n (%)	<u>Group 2</u> (n = 50) n (%)	<u>Total</u> (n = 80) n (%)	<u>Statistic</u> (X^2) (unless stated)	<u>Proba</u> bility	<u>Odds Ratio</u> (95% Confidence Interval)
CISCASE	13 (43)	15(30)	28 (35)		ns	1.78 (0.63 - 5.10)
GHQCASE	19 (63)	24 (48)	43 (54)		ns	1.87 (0.67 - 5.26)
BDIa	6 (20)	4 (8)	10 (13)	Fisher's	ns	2.88 (0.61 - 15.04)
BDIb	8 (27)	7 (14)	15 (19)		ns	2.23 (0.63 - 8.05)
STAIS CASE	4 (13)	5 (10)	9 (11)	Fisher's	ns	1.50 (0.27 - 7.67)
Phobias	12 (40)	5 (10)	17 (21)	8.4	0.004	6.00 (1.63 - 24.41)
Comments of nervousness	18 (60)	21 (42)	39 (49)		ns	2.07 (0.75 - 5.79)

TABLE 3 . 13 : <u>SUBSIDIARY VARIABLES FOR PSYCHIATRIC</u>
<u>MORBIDITY ALSO IDENTIFIED IN CASES OF PTSD</u>

Variable	<u>Cases of PTSD</u> (n = 17) n %	
CISCASE	9	(55)
BDIa	6	(35)
BDIb	8	(47)
STAIS	4	(24)
Accident Related Symptoms	8	(47)
Comments of Nervousness	13	(76)

TABLE 3 . 14 : ANALYSIS OF CONTINUOUS OUTCOME VARIABLES ACROSS TIME

(A)

	GROUP 1			GROUP 2			TOTAL		
	GHQ (n = 18)	CISR (n = 18)	IES (n = 18)	GHQ (n = 34)	CISR (n = 34)	IES (n = 34)	GHQ (n = 52)	CISR (n = 52)	IES (n = 52)
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
T1	3.9 (5.6)	8.3 (10.9)	18.6 (11.9)	4.4 (5.5)	7.0 (7.9)	15.5 (11.0)	4.3 (5.5)	7.5 (9.0)	16.6 (11.3)
T2	4.4 (5.7)	7.4 (9.6)	16.4 (10.5)	3.9 (6.0)	5.8 (9.8)	9.1 (9.5)	4.1 (5.8)	6.4 (9.7)	11.6 (10.4)
T3	3.4 (4.5)	6.4 (8.2)	10.1 (8.4)	1.6 (3.3)	2.9 (5.8)	3.7 (7.1)	2.2 (3.8)	4.2 (6.9)	5.9 (8.1)
T4	1.5 (3.4)	4.3 (5.3)	7.3 (8.7)	1.0 (4.3)	2.5 (7.3)	1.6 (4.4)	1.2 (4.0)	3.2 (6.6)	3.6 (6.7)

T1 = Entry to study: T2 = six weeks assessment: T3 = six months assessment: T4 = one year assessment

Significance Tests

	Group	Time	Group Effect/Time
GHQ	$F = 0.3; p = 0.6$	$F = 6.5; p < 0.001$	$F = 0.7; p = 0.6$
CIS	$F = 1.3; p = 0.3$	$F = 4.9; p = 0.003$	$F = 0.3; p = 0.8$
IES	$F = 8.1; p = 0.006$	$F = 33.9; p < 0.001$	$F = 0.9; p = 0.5$

TABLE 3 . 14 : <u>ANALYSIS OF CONTINUOUS OUTCOME VARIABLES ACROSS TIME</u>

(B)

	<u>GROUP 1</u>			<u>GROUP 2</u>			<u>TOTAL</u>	
<u>BDI</u> (n = 18) Mean (s.d.)	<u>STAIT</u> (n = 18) Mean (s.d.)	<u>STAIS</u> (n = 18) Mean (s.d.)	<u>BDI</u> (n = 34) Mean (s.d.)	<u>STAIT</u> (n = 34) Mean (s.d.)	<u>STAIS</u> (n = 34) Mean (s.d.)	<u>BDI</u> (n = 52) Mean (s.d.)	<u>STAIT</u> (n = 52) Mean (s.d.)	<u>STAIS</u> (n = 52) Mean (s.d.)
T1								
T2 5.5 (10)	30.6 (13.1)	27.9 (12.6)	4.2 (8.8)	27.4 (12)	24.4 (8.6)	4.6 (9.2)	28.5 (12.4)	25.6 (10.2)
T3 3.6 (6.5)	28.7 (10.4)	24.1 (10)	2.0 (6.0)	23.9 (8.8)	23.2 (7)	2.5 (6.2)	25.6 (9.6)	23.5 (8.1)
T4 2.3 (3.6)	24.7 (8.0)	21.2 (2.4)	1.9 (6.5)	23.1 (9.8)	22.1 (7.3)	2.1 (5.7)	23.6 (9.2)	21.8 (6.1)

T1 = entry to study: T2 = six weeks assessment: T3 = six months assessment: T4 = one year assessment

<u>Significance Tests</u>

	<u>Group</u>	<u>Time</u>	<u>Group Effect/Time</u>
BDI	F = 0.4; p = 0.6	F = 4.9; p = 0.009	F = 0.2; p = 0.8
STAIT	F = 1.4; p = 0.3	F = 9.3; p <0.001	F = 0.9; p = 0.4
STAIS	F = 0.4; p = 0.5	F = 5.7; p = 0.004	F = 1.5; p = 0.2

TABLE 3 . 15 <u>COMPARISON OF PTSD CASES AND NON CASES FOR POTENTIAL RISK FACTORS</u>

<u>Variable</u>	<u>Subjects with PTSD</u> (n = 17)	<u>Subjects without PTSD</u> (n = 52)	<u>Statistic</u> (X^2 unless specified)	<u>Probability</u>
	<u>Mean (s.d.)</u>	<u>Mean (s.d.)</u>		
Impact of Events Scale	23.2 (8.8)	13.1 (11.3)	t	0.001
Age	37.4 (11.9)	35.1 (12.2)	t	ns
	<u>n (%)</u>	<u>n (%)</u>		
Group One	11 (65)	16 (31)	4.9	0.03
Gender male	12 (71)	26 (50)		ns
Married	8 (47)	25 (48)		ns
Employed	11 (65)	37 (71)		ns
Manual workers	10 (59)	19 (37)		ns
Past Psychiatric History	4 (24)	8 (15)	Fisher's	ns
Family History of Psychiatric Illness	0 (0)	4 (8)	Fisher's	ns
Past RTA	7 (41)	26 (50)		ns
Alcohol Pre Accident	5 (29)	3 (6)	Fisher's	0.02
Accident severe/life threatening	12 (71)	24 (46)		ns
Injury Severity Score > 2	13 (76)	34(65)		ns
Amnesia Post Accident	4 (24)	7 (13)	Fisher's	ns
Abnormal Personality	3 (18)	4 (8)	Fisher's	ns

t = Students t test

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TABLE 3 . 16   **LOGISTIC REGRESSION ANALYSIS**

METHOD: BACKWARD STEPWISE (WALD) - FINAL MODEL

Predictor Variables	Probability	Odds Ratio	95% Confidence Interval
(1) Group	0.01	0.18	0.05 - 0.69
(2) Impact of Events Scale	0.003	1.09	1.03 - 1.16
(3) Alcohol pre accident	0.09		

TABLE 3 . 17 :　　　　**ANALYSIS OF VARIABLES RELATING TO LITIGATION**

(A)　AT SIX WEEKS

Variable	Group 1 (n= 27)	Group 2 (n=42)	Total (n=69)	Statistic	Proba bility	Odds Ratio (95% Confidence Interval)
	n %	n %	n %			
Accident related symptoms	24 (89)	35 (83)	59(86)	Fisher's	ns	1.60(0.32 - 10.47)

(B)　AT SIX MONTHS

Variable	Group 1 (n= 20)	Group 2 (n=35)	Total (n=55)	Statistic	Proba bility	Odds Ratio (95% Confidence Interval)
	n %	n %	n %			
Accident related symptoms	13 (65)	19 (54)	32(58)	X^2	ns	1.56(0.44 - 5.68)
Personal injury claim	9 (45)	18 (51)	27(49)	X^2	ns	0.77(0.22 - 2.67)

(C) AT ONE YEAR

Variable	Group 1 (n= 18)	Group 2 (n=34)	Total (n=52)	Statistic	Proba bility	Odds Ratio (95% Confidence Interval)
	n %	n %	n %			
Accident related symp-toms	10 (56)	14 (41)	24(46)	X^2	ns	1.79(0.49 - 6.65)
Personal injury claim	9 (50)	19 (56)	28(54)	X^2	ns	0.79(0.22 - 2.88)

TABLE 3 . 18 : **ANALYSIS OF PERSONAL INJURY CLAIMS FOR COMPENSATION AT ONE YEAR**

Variable	Claim submitted (n= 29) n %	Claim not submitted (n=23) n %	Total (n=52) n %	Statistic	Probability	Odds Ratio (95% Confidence Interval)
Accident related symptoms	19 (66)	4 (17)	23(44)	x^2	0.001	9.02(2.10 - 44.66)

Variable	Claim resolved (n= 7) n %	Claim not resolved (n=22) n %	Total (n=29) n %	Statistic	Probability	Odds Ratio (95% Confidence Interval)
Accident related symptoms	4 (57)	15 (68)	18(62)	Fisher's	ns	0.62(0.08 - 5.52)

CHAPTER FOUR　　　DISCUSSION

4.1: INTRODUCTION

This study identified psychiatric morbidity following road traffic accidents. At least one fifth of the subjects suffered from PTSD during the first year following the accident. Those subjects who were admitted to hospital were four times more likely to suffer from PTSD than those who were not admitted. The natural course of the condition was to improve over time. Other psychological consequences were also identified. Two variables, the Impact of Events Scale and Group Membership were predictive factors for the development of PTSD. Accident related symptomatology was not influenced by seeking compensation.

This chapter examines methodological issues and discusses each aspect of the above findings in relation to the literature discussed in the Introduction to this thesis. It compares the diagnostic classifications for PTSD available at the time of the study. It concludes with the clinical implications of the findings and suggestions for future directions for research.

4.2: METHODOLOGICAL ISSUES

There are certain methodological issues to be taken into consideration when interpreting these results.

4.2.1: SAMPLE SIZE

Few comparable studies were available at the commencement of this research in 1991. The required sample size was, therefore, estimated using the best guide available at the time. These were the studies of Malt (1988) and Feinstein & Dolan

(1991). It was estimated that a sample size of 50 per group would be required to detect the effect of difference between the two groups. However, although recruitment took place over the course of one year, only 30 patients could be recruited to the group which was admitted to hospital, although the target was reached in those who were not admitted to hospital, 50 subjects being recruited. The anticipated rates for the two groups were 1% and 20%, a difference of 19%. The results obtained were 12% and 37%, a difference of 25%. As this difference was larger than the anticipated difference, the sample size was large enough to demonstrate significant differences.

This study used a number of assessment procedures. There are dangers of obtaining false positive results when multiple significance tests are used. Consideration was given to making a conservative correction to the significance tests using Bonnferoni correction. This was prohibitive as it involved dividing all significance levels by the number of tests carried out. Therefore, it was decided that for variables other than the major outcome variables, a significance level of 0.01 would be required to demonstrate clear differences and a significance level of 0.05 would be only a guide to potential differences.

4.2.2: <u>BIAS DUE TO RECRUITMENT</u>

Studies such as this are subject to recruitment bias. This was examined for by comparing available baseline measures of all eligible subjects. Those subjects formed four groups - Group One - those entering the study who were admitted to hospital, Group Two - those entering the study who were not admitted to hospital, Group Three - those who refused entry to the study and Group Four - those who could not be contacted. The Injury Severity Score was considerably higher among those subjects admitted to hospital, as expected. There was some evidence that males were more likely to be admitted to hospital and to refuse to enter the study, although this only reached the 0.05 level of significance. There were no significant differences on any

other variables, so it seemed unlikely that there was any important degree of selection bias for recruitment. This validated the study design.

4.2.3: BIAS DUE TO ATTRITION

Inevitably, in a study of this nature involving relatively mild injury and a long study period, people will be lost to follow up. At the end of one year, which saw completion of the study, Group One had reduced in size from 30 to 18, and Group Two from 50 to 34. However, one of the symptom clusters of PTSD is avoidance phenomena. It was possible that those lost to follow up had dropped out of the study because they were suffering from PTSD and were avoiding painful reminders of the accident. There was thus potential for introducing bias into the study. Therefore, an analysis was undertaken to examine for any sample bias introduced by those subjects who failed to complete the study. Subjects who completed the study were compared with those who did not complete at each time point assessment - at six weeks, six months and one year, using available baseline data. As evidenced in Chapter 3.2.3 it is unlikely that subjects were lost to follow up because they suffered avoidant phenomena of PTSD. This suggests that it is unlikely that any important degree of bias was introduced into the study by those lost to follow up.

4.2.4: PRESENTATION OF RESULTS

The results of the main outcome variable for psychiatric morbidity, PTSD, and the subsidiary variables are presented in a conservative manner. The number of cases identified during the course of the study (one year) are presented as a proportion of the total sample. It is accepted, as evidenced in section 3.3.2 of the results, that this might not accurately reflect the true picture as some cases of PTSD might have arisen in those subjects lost to follow up. However, the indications are that the number is likely to be relatively small and it was decided to err on the side of caution. It was

possible to identify with certainty that at least 21% of subjects developed PTSD during the course of this study.

4.2.5: DEFINITION OF PTSD

The Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association,1987 (DSM111R) describes the stressor for PTSD as ......" an event outside the range of the usual human experience...markedly distressing to almost anyone ". The Tenth Revision of the International Classification of Diseases and Related Health Problems (ICD10) describes the stressor as ...."an exceptionally threatening or catastrophic nature...pervasive distress in almost anyone...serious accident". The stressor criterion could be deemed to be satisfied in those subjects exposed to the more severe accident event who required admission to hospital. It could not be deemed to be satisfied in those subjects exposed to a less severe accident who did not require admission to hospital. This study was designed to ascertain whether the severity of the event was a relevant factor in the development of PTSD. Therefore, the stressor criterion was disregarded. PTSD was diagnosed if the clinical criteria were satisfied.

4.2.6: PSYCHOLOGICAL ASSESSMENT

Some of the psychological assessment scales used in this study are frequently used as self report questionnaires. In this study they were used as interview schedules and were administered by the author. It was considered that this was a more sensitive way of eliciting psychopathology and would improve compliance. On occasions it was necessary because of the physical disability of the subject.

The majority of the measurements were carried out at personal interview. Eight of the personality assessments (Standardised Assessment of Personality), five from Group One and three from Group Two, were undertaken by telephone due to non-

availability of the informant who was either out of the area or worked difficult hours. One assessment was not completed as the subject failed to return with contact details. That subject subsequently dropped out of the study. With regard to the other assessments one subject left the area after the initial assessment and subsequent assessments were carried out by telephone. One subject remained in hospital at the six weeks assessment stage but was discharged after eight weeks. He subsequently dropped out of the study. Three assessments at six months were also carried out by telephone, two from Group One and one from Group Two as two subjects were working and it was inconvenient for the other subject.

Psychological assessments from six weeks included the BDI and STAI. They were not administered at the initial interview which was already time consuming. Psychiatric morbidity was already assessed by the CISR and GHQ, both of which assess anxiety and depression. Moreover, a normal period of distress was anticipated following the accident. Adding to that distress by exposing the subject to prolonged assessment was not justifiable and could have affected compliance with future assessments. The subsequent administration of the BDI and STAI scales gave additional information about any depressive and anxiety symptoms that might be present. This was distinct from the presence of general psychiatric disorder identified by the CISR and GHQ. The latter scales differentiated psychiatric cases (those suffering from morbidity) from non cases (those who considered themselves well).

PTSD is a characteristic constellation of symptoms which by definition relate to the accident. Therefore, it is relatively straightforward to identify whether it is present or not. However, this does not apply to general psychiatric disorder. It is conceivable that some cases of psychological disturbance, at the point of entry to the study, or arising at subsequent assessments, could be due to factors other than the accident. An attempt was made to assess this by recording details of any psychiatric illness prior to the accident and the presence of major life events during the year preceding the accident. The CISR instrument also contains a section on mental health which asks whether the subject had been feeling emotional lately, and whether

anything had happened to make the subject feel like that. The section on depression asks what most affected the subject's mood. The presence of any new life events, change of circumstances and accident related symptoms, whether mental or physical were documented at each assessment point. Using this information it was possible to ascertain whether psychiatric morbidity, depression or anxiety were accident related or whether there was an independent or contributory cause not associated with the accident.

Four subjects (one in Group One and three in Group Two) had active psychological symptoms at the time of the accident. All suffered anxiety, one additionally suffering from depression another from a drink problem. All three in Group Two were identified as suffering psychiatric morbidity on the CISR at entry to the study but not the subject from Group One. That subject suffered from anxiety and was receiving medication for that condition at that time. Eight subjects identified possible independent causes for mood changes other than the accident at entry to the study and two new subjects at six weeks but none subsequently. Of these ten subjects six were identified on the CISR as cases of psychiatric disorder.

Caution needs to be exercised, therefore, when interpreting the results of the CISR, GHQ, BDI and STAI in relation to consequences of the accident. These constraints do not apply to interpreting the presence of PTSD because of the unique relationship of PTSD to the accident. PTSD was, therefore, adopted as the main outcome variable for psychiatric morbidity for this study.

4.3: COMPARISON OF RESULTS OBTAINED WITH OTHER STUDIES

There are few studies in the literature with which to compare this study. The majority of studies relate to combat, crime and disasters. It is difficult to make a meaningful comparison with those that are available as the studies have different designs and have used different methods for assessing PTSD. Many studies assess

PTSD at only one moment in time. Various methods have been adopted for the analysis and presentation of the results. The pattern of PTSD is variable across time with fluctuating and delayed onset cases. In this study, as stated in section 4.2.4, the prevalence was estimated when the number of cases obtained during the course of the study was presented as a proportion of the total sample (n = 80). The DSM111R criteria for PTSD and CISR for case identification for psychiatric disorder were the variables adopted for comparison and discussion with other studies.

4.3.1: POST-TRAUMATIC STRESS DISORDER

This study, using DSM111R criteria identified at least 21% (95% Confidence Interval 1.21 to 15.38) of PTSD in subjects during the year following the road traffic accident. This figure was obtained when the number of cases was presented as a proportion of the total sample.

Heltzer *et al.*, (1987) found a lifetime rate of PTSD of 1% in a general adult population while Davidson *et al.*, (1991) found the lifetime prevalence to be 1.5%. Breslau *et al.*, (1991) in a study on an urban population of young adults found that the rate of PTSD in those who were exposed to a traumatic event fulfilling the stressor criterion of DSM111R classification was 23.6%. However, the rate varied across events, the rate for sudden injury or serious accident being 11.6%. Norris (1992) estimated the current rate for motor vehicle accidents to be 12%.

The studies which are most comparable are those of Mayou *et al.*,(1993) and Blanchard *et al.*, (1995). Mayou *et al.* found that 11% of their study satisfied the DSM111R criteria for PTSD. That figure was estimated when the number of cases of PTSD obtained during the course of the study were presented as a proportion of those who remained in the study. If the rate of PTSD was estimated as a proportion of the total sample a rate of 10.1% was obtained. Blanchard *et al.* found 39% in their study (and higher figures in earlier studies), using DSM111R criteria. That figure was a proportion of their sample one to four months post accident. A more appropriate

figure for comparison from the present study would be the six weeks or six months assessment, 20% or 11% respectively. This study obtained a figure of 21% using DSM111R criteria and falls between the two studies cited. The difficulties in making a meaningful comparison between the studies is evident. All these studies highlight that the condition does exist post accident and in sufficient quantities to be a major health hazard following a road traffic accident.

There are possible explanations for the discrepancy in these results. Mayou *et al.* addressed a British population comprising major and minor injured but did so by examining three representative groups of accident victims, two for major injuries and one for minor injuries. They had a large number of subjects who were unable to remember the accident. Blanchard *et al.* addressed an American population that was not random but was recruited from advertisement and approaching medical practitioners. Their subjects might or might not have been hospitalised and were paid for their participation. Both of these studies recruited large numbers, Mayou *et al.* 188 and Blanchard *et al.* 158, whereas 80 were recruited for this study. This study addressed a British population and examined two groups of accident victims, who were differentiated on the severity of the accident as to whether they were admitted to hospital or not. They were general road traffic accident victims other than those with serious head injury or who had been involved in a fatal accident. It might be that the larger numbers in the other two studies gave a more accurate reflection of the true picture. Given the wide discrepancy between the two results, it seems more likely that different populations of accident victims were examined in all three studies.

Goldberg & Gara (1990) found 14.5% of PTSD at fifteen months in their study of motor vehicle accidents. That figure would be comparable to the 8% found at one year in this study. However, their study was retrospective and comprised only 55 cases. The present study does support the work of Green *et al.*, (1993) who found 29% PTSD (comparable to the 21% obtained in this study) in their sample of victims of road traffic accidents. However, Green *et al.'s* study comprised a small sample of 24 patients who had all been admitted to hospital and who would compare more with

Group One in this study for whom a rate of 37% was obtained. Brom *et al.*, (1993) found 10% PTSD in their study, which compares with the figure obtained by Mayou *et al.* However, Brom *et al.*'s study involved serious road traffic accidents and subjects were followed up for six months.

Three other similar studies involving accidental injury but not restricted to road traffic accidents were those of Malt (1988), Feinstein & Dolan (1991) and Shalev *et al.*, (1996). They all applied to hospital subjects. Malt (46% of his sample were road traffic accident victims) found 1% of PTSD at six months but none at final follow up (mean 28 months). Feinstein and Dolan (36% of the sample were road traffic accidents) found 18% PTSD at six months. Shalev *et al* (53% of their sample were road traffic accidents) found 26% PTSD at six months. The comparable figure at six months for this study was 11%. However, as all the studies applied to hospital subjects a more appropriate comparison would be with the figure obtained for Group One in this study - 25%. Malt's figures are surprisingly low and it is difficult to find an explanation for this. His finding of symptoms suggestive of PTSD occurring in less than 5% of subjects in his 1993 study is also low. It might be that the Norwegians in Malt's study have some protective feature that mitigates against the development of PTSD in these circumstances. The figure obtained by Shalev et al., is comparable and that obtained by Feinstein and Dolan although lower is broadly comparable although the sample populations differed.

It is difficult to draw conclusions save to say that except for Malt, all investigators in the studies outlined identified PTSD in their studies after accidents. Excluding Malt's study, a sizeable health problem is demonstrated.

This study identifies a sizeable health problem for a general population of road traffic accident victims, at least one out of every five people being subjected to this condition following an accident. It disproves the null hypothesis and supports the hypothesis that psychiatric morbidity, as identified by a condition of post-traumatic

stress disorder, does occur in some individuals after exposure to a traumatic event, such as a road traffic accident, and is a common event.

4.3.2: COMPARISON OF POST-TRAUMATIC STRESS DISORDER IN THE TWO SAMPLE GROUPS

One aim of this study was to examine whether the severity of the accident event was relevant in producing psychiatric morbidity. Therefore, PTSD was examined in the two sample groups, one admitted to hospital the other not. Those subjects admitted to hospital were deemed to have suffered a more severe accident. The injury severity score was considerably higher among those subjects admitted to hospital than in those not admitted. The accident victim's subjective response to the accident was measured by the Impact of Events Scale. Those subjects admitted to hospital remained more subjectively distressed by the accident they had been exposed to than those not admitted to hospital although there was no evidence that the two groups differed in their rate of improvement.

This study, using DSM111R criteria, identified PTSD in both groups during the year following the accident. It was identified in 37%(11) of Group One and 12%(6) of Group Two. The groups differed significantly on this variable (O.R. = 4.25, C.I. 1.21 - 15.38). This is the first study to compare two general road traffic accident populations in this way. The nearest study to this in the literature is that of Mayou *et al.*, (1993), who examined major and minor injury in certain groups of accident victims. Although identifying PTSD in all the groups they did not compare the groups, save to draw attention to the fact that while motorcyclists suffered more psychiatric disorder than the other groups, the minor injuries group (whiplash) described very similar problems to those with more severe physical injury. Mayou *et al.* also described additional psychological problems. At one year, they identified PTSD in 6% of car occupants, 11% of motorcyclists and 5% of whiplash injuries. At one year the present study identified 17% in the more severe accident group and 3% in the less severe

accident group. The figure obtained in this study for the more severe accident group is higher than that in Mayou *et al.*'s study although the figures for those with minor injuries, 3% in this study and 5% in Mayou *et al.*'s are comparable. Kuch *et al.*, (1994) demonstrated that survivors of road traffic accidents with minimum injury can be disabled with PTSD. In their sample, a highly selected population who were referred for treatment of chronic pain at least two years post accident 38% suffered phobias and 38% of those suffered from PTSD (approximately 13%).

Feinstein and Dolan (1991) and Green *et al.*, (1993) examined cohorts of hospitalised patients which could be compared with the admission group for this study. Feinstein and Dolan found 18% PTSD at six months and Green *et al.* 33% at eighteen months. For the admission group this study found 25% PTSD at six months and 17% at one year. The figures are broadly in agreement but the same reservations discussed earlier apply when interpreting these results. The majority of other studies examining stressor severity are related to combat and crime. However, March (1993), in his review of studies on combat, crime, disasters and accidents found that in sixteen out of nineteen studies examined stressor intensity endorsed a dose response relationship.

This study supports the presence of PTSD in both groups studied, those exposed to a more severe accident event (as measured by admission to hospital) and those exposed to a less severe accident event (as measured by non admission to hospital). This study's figures of 37%(11) of PTSD during the year following exposure to an accident for those exposed to a more severe accident event, and 12%(6) for those exposed to a less severe accident event, support the criterion that the severity of the event is indeed relevant and that the more severe the event the more likely the victim is to develop PTSD. Those subjects admitted to hospital were four times more likely to develop PTSD than those not admitted to hospital. It disproves the null hypothesis and supports the hypothesis that the severity of the event is a relevant factor in the development of PTSD. However, in the present study, just over one in eight of those subjects who were not exposed to a severe accident developed PTSD. This represents a major health concern for a traumatic event where the stressor could

not be said to be "outside the range of human experience ...to be markedly distressing to almost anyone" as stipulated in the DSMIIIR classification for PTSD.

4.3.3: <u>NATURAL COURSE OF POST-TRAUMATIC STRESS DISORDER</u>

This study found that the natural course of PTSD was to resolve with time. Using DSM111R criteria it was identified in 1 in 5 of the sample at six weeks post accident and approximately 1 in 13 at one year. The majority of cases were present at six weeks but resolved by six months. Delayed onset PTSD is specified as occurring at least six months after the trauma. In two subjects PTSD appeared for the first time at six months assessment. However, it is not known how long symptoms had been present, the previous assessment being at six weeks. In one subject PTSD was of delayed onset, appearing for the first time at one year. Three subjects (5%) followed a chronic course, being present throughout the study.

With regard to the three delayed onset cases of PTSD, two appeared at six months. One was the case of a pedestrian who was hit by a car while crossing the road. He was afraid that the car would go over him and reported thinking ..."This is it". He sustained a ruptured knee tendon. The second was the case of a car driver, involved in a head on collision with a bus. He suffered from a compound fracture of radius and ulna. He sustained two further minor accidents two weeks and a few days prior to the six months assessment. He denied that either accident had any effect upon him. However, it could be postulated that these two accidents, so near to the time of the assessment had provoked memories of his previous more severe accident. His PTSD had resolved at one year, the time of the next assessment. The third case appeared at one year and was that of a rear seat car passenger who suffered from whiplash and abrasions.

The three chronic cases all sustained severe injuries. One had been walking her daughter home from school on the pavement when she was hit by a car that had driven

around a corner at too fast a speed and lost control. She was thrown over a fence. She had been informed that she was lucky to be alive. She was severely disabled with multiple injuries. The other case was that of a man who was hit by a car while crossing the road. He rated the threat to life posed by the accident as severe and sustained a fractured tibia and fibula. The third chronic case had a past history of psychiatric illness twenty-one years earlier and was driving his car when a car suddenly pulled out into the road in front of him. He was worried about his back as he had been told that if his spine moved he would be paralysed. He considered the threat to life posed by the accident was severe and suffered chest pain and bruising of his leg. There were insufficient cases to be able to identify why the three patients developed a chronic course or to reach any conclusions about the development of chronicity.

This study supports the general view in the literature that there are multiple variations for the course of PTSD. It may be acute, delayed, chronic, intermittent and recurrent, although no intermittent nor recurrent cases presented over the course of one year in this study. Blank (1993) reviewed thirty studies emanating mainly from war, crime and disasters. He concluded that PTSD often persisted over time and that there were multiple variations in the natural history of PTSD. Acute, delayed, chronic, intermittent and reactivated patterns have all been identified. Studies following accidental injury suggest that PTSD persists over time and that the onset might be delayed. Feinstein and Dolan (1991) in their study of physical trauma victims found 27% PTSD at six weeks and 18% at six months. Perry et al., (1992) examined hospitalised burn survivors. They identified 53% PTSD at two months, 40% at six months and 45% at twelve months. Rocca et al., (1992) in their study of burn survivors identified 7% at discharge from in-patient treatment and 22% at four months following discharge. Kessler et al., (1995) found in the National Co-morbidity Survey that more than one third of persons with PTSD never fully remit even after many years, and irrespective of whether they were receiving treatment.

Little is available in the literature in respect of road traffic accidents. Mayou et al., (1993) found that of nineteen subjects with PTSD, eight had the disorder at three

and twelve months, five at three months, and six at twelve months. Five percent of his cases persisted throughout the year. This compares with the figure of 5% obtained in this study. Blanchard *et al.*, (1995) found that a quarter of those who suffered PTSD had resolved six months after the first assessment. This study, however, found that the majority of cases present at six weeks had resolved by six months.

This study demonstrated that the natural course of PTSD was to resolve with time, the majority of cases being present at six weeks but resolving by six months. However, it was possible for the onset of PTSD to be delayed and for a small number (nearly 1 in 20) to pursue a chronic course.

4.3.4: OTHER POST ACCIDENT PSYCHOLOGICAL CONSEQUENCES AND THEIR RELATIONSHIP TO POST-TRAUMATIC STRESS DISORDER

Psychological consequences, other than PTSD, have been documented following exposure to a traumatic event, such as a road traffic accident. This is not surprising when one considers the overlap of symptoms of PTSD with symptoms of other disorders. Several of the criteria C and D symptoms of PTSD overlap with the symptoms of depression while several criterion C symptoms overlap with symptoms of anxiety and Criterion D6 with social and simple phobias. These consequences may take the form of co-morbidity with PTSD, or may stand alone. A whole range of psychiatric disorders has been identified following various traumatic events.

Breslau *et al.*, (1991) found 37% co-morbid depression among urban dwellers with PTSD while the most common concurrent diagnoses with PTSD for a sample of disaster survivors and Vietnam veterans (Green *et al.*, 1992) were major depression, phobic disorder and generalised anxiety disorder. Kessler *et al.*, (1995) found that at least one other disorder was present in 88% of men and 79% of women

with lifetime PTSD. Disorders included affective disorders, anxiety, substance abuse and conduct disorder.

Studies of accidental injuries and road traffic accidents have identified psychiatric disorders other than PTSD. Jones and Riley (1987) in their study of 327 subjects involved in civil accident litigation found that a precise psychiatric diagnosis was only applicable in a minority of subjects although psychiatric symptoms including pain, anxiety and depression were prominent. Malt (1988) found 17% of his sample had a non-organic psychiatric disorder during follow up but no PTSD. Goldberg and Gara (1990) noted major depression to be three times more frequent than PTSD in their sample. Mayou *et al.*, (1993) in their study of road traffic accident victims found that 41% reported anxiety or depression at assessment and one tenth of subjects at one year suffered mood disorders (anxiety and depression, anxiety being most common) and 15% travel (phobic) anxiety at one year. Malt (1993) in his study of road traffic accident victims found psychiatric problems (identified by GHQ 20) in 31% of the adults in his study whilst 26% reported nervousness as a consequence of the road traffic accident. Depressive symptoms were more common than anxiety. Blanchard *et al.*, (1995) in their study on motor vehicle accident victims documented that 53% of their subgroup PTSD also met the criteria for current major depression. Bryant and Harvey (1995) found that in their study 41% showed significant levels of psychological impairment and 48% suffered avoidance of road transport.

The present study investigated other post accident psychiatric consequences and their relationship with PTSD. This was carried out by examining for the presence of psychiatric disorder, symptoms of depression and anxiety and symptoms related to the accident circumstances.

(i)   <u>CASES OF PSYCHIATRIC DISORDER</u>

CISR and GHQ instruments were used to detect the presence of psychiatric disorder and differentiate psychiatric cases (those suffering morbidity) from non cases (those who on self assessment considered themselves well). This study, using the GHQ instrument identified at least 54% (43) of cases of psychiatric disorder during the year following the accident. The CISR instrument identified 35% (28). The GHQ identified 33% (26) at entry to the study and the CISR 25% (20). These figures are higher than the 20% of psychiatric disorders identified by the GHQ among patients in General Practice (Goldberg & Blackwell, 1976) but are broadly comparable to the 27% prevalence of minor psychiatric morbidity obtained for adults presenting at Accident and Emergency using the GHQ 12 for assessment (Singh *et al.*, 1987). Both variables showed a decline of disorder over time, the GHQ falling from 33% (26) at entry to 6% (3) at the end of one year post accident, and the CISR from 25% (20) at entry to 8% (4) at one year. As stated in section 3.7, it was decided to adopt the more conservative estimate of psychiatric disorder and use the CISR to measure this. The CISR figure is quoted here.

It is difficult to compare precisely the figures obtained in this study with those obtained from other studies. Differing measures of assessment of psychiatric morbidity were used in different studies at different assessment time points and not all referred to road traffic accident victims.

However, the figure obtained during the course of this study (35%) is higher than that obtained in Malt's 1988 study. Malt, used GHQ 20 and Comprehensive Psychopathological Rating Scale and found 17% of his subjects had a non organic psychiatric disorder during follow up (mean 28 months), although his figure of 9% at the end of two years compares with the 8% obtained in this study at the end of one year. The figure compares with Malt's figure of 31% obtained in his 1993 study. The 25% of psychiatric cases obtained at entry to this study is lower than Mayou *et al.*'s 41% of subjects who reported anxiety and depression above the clinical threshold but

the 8% at the end of the study compares with his 10% of subjects at the end of one year who suffered from mood disorders. Mayou *et al.* used the Present State Examination in their study. Feinstein and Dolan (1991) used the CIS and found that 63% of the sample proved to be cases within the first week post accident. This fell to 25% at six weeks and 20% at six months. The figures are higher than those obtained in this study which found only 25% of subjects proved to be cases at entry to the study, and 13% at six months, although the six weeks assessment figures compare in both studies. However, not all their subjects were road traffic accident victims.

This study also found that the course of psychiatric disorder identified by the CISR, as for PTSD, was to improve over time. There appeared to be a pattern of much distress immediately after the accident, which tended to settle, although a small number of cases ran a fluctuating course and a small number a chronic course.

Psychiatric cases were not synonymous with PTSD but there was a measure of agreement in just over half the cases of PTSD. The three chronic cases of PTSD were also chronic cases of psychiatric disorder over three of four possible assessment time points.

(ii)   <u>DEPRESSION</u>

The presence of depressive symptomatology was the next psychological consequence examined and any relationship with PTSD ascertained. The intensity of the depression was identified using the Beck Depression Inventory.

Few cases of depression of moderate or severe intensity were identified - 13% (10) over the course of the study. This figure was obtained when the number of cases was presented as a proportion of the total sample. However, when the threshold score was reduced to 10, to embrace mild depression 19% (15) cases were identified.

In only 1% (1) was depression present alone. Forty-seven per-cent (8) of those subjects suffering from PTSD suffered depression of mild intensity and above and 35% (6) of moderate intensity and above. One chronic case of PTSD also suffered chronic

depression. In just under half (8 - 47%) the cases of PTSD subjects were also identified as cases of psychiatric disorder and suffered depressive symptomatology.

Possible independent or contributory causes for mood changes not related to the accident were present in five subjects with depressive symptomatology, in three when PTSD and psychiatric disorder amounting to a psychiatric case also existed.

The figure of 47% of cases of PTSD suffering co-morbid depression compares with the findings of Blanchard *et al.* of 53% (1995) and 48% (1994). However, Blanchard *et al.* denoted current major depression, whereas in this study the intensity of depressive symptomatology was measured, not depressive illness diagnosed. The figure of 47% was for depression of mild intensity and above. The corresponding figure for depression of moderate intensity which would compare better with the intensity of symptoms expected with a major depressive illness was 35% (6). This figure compares with the 37% found by Breslau *et al.*, (1991) who again referred to major depression. It is difficult to make comparisons with the literature as findings have been reported in different ways for different populations.

(iii)   ANXIETY

Anxiety was measured using the Speilberger State-Trait Anxiety Inventory. There was no indication of the sample population being abnormally anxious.

When individual cases of anxiety above the threshold for clinical disorder were examined 11% (9) cases of clinical anxiety were identified. Twenty-four per-cent (4) of cases who suffered from PTSD also suffered clinical anxiety.

(iv)   CONCERN ABOUT ACCIDENT RELATED ACTIVITY

There is a paucity of literature on the effects of road traffic accidents on accident related activity. Kuch *et al.*, (1985) found a high rate (77%) of phobic avoidance for driving Mayou *et al.*, (1991) found that one fifth of the motorcyclists in their study had stopped using a motorcycle and nearly one half of motorcyclists and

vehicle drivers reported being more cautious in their driving. One third still suffered anxiety about the situation similar to the accident 4 - 6 years later, and many people were anxious about being passengers. Malt (1993) found that 26% of the adults in his sample reported nervousness as a consequence of their road traffic accident. Mayou *et al.*, (1993) designated the term travel anxiety for this condition which they found to be more common than PTSD - at one year 15% of their sample suffered from phobic anxiety as assessed by the P.S.E. Kuch *et al.*, (1994) found 38% of 55 road vehicle accident survivors met DSM111R criteria for simple phobia after the accident. Bryant and Harvey (1995) found that 48% of their sample suffered from avoidance of road transport. Blanchard *et al.*, (1995) found that over half of their motor vehicle accident victims with PTSD who were still driving, avoided all discretionary travel and 15% had driving phobias.

This study (which included pedestrians) examined responses to the phobic section of the Clinical Interview Schedule Revised from six weeks post accident. It also examined subjects' responses to questions as to whether they had resumed their pre accident activity and as to whether they had any accident related symptoms, mental or physical. Some subjects, although denying phobias did admit to nervousness regarding accident related activity. Only phobias and responses that were related to accident activity were counted. Phobias were identified in 21% (17) subjects throughout the course of the study. The figure of 8% at one year is less than that identified by Mayou *et al.* (15%) and Kuch *et al.* (38%). Of those subjects with PTSD, 47% (8) also had accident related phobias, although two occurred at different assessment time points to the presence of PTSD. This figure is higher than that identified by Blanchard et al., (15%)

Examination of subjects' comments revealed .... "avoid the accident site", "frightened to cross the road", "drive where I know", "scared to get on a motor bike", "cautious", "wary", "more aware in traffic", "panic in a car". The majority appeared to be more cautious of the presence of traffic and the possibility of sustaining an accident

and being uncomfortable rather than displaying a frank avoidance of activity

Over the course of this study 49% (39) subjects made comments expressing nervousness connected either with travelling as a driver or a passenger or related to the circumstances of the accident e.g. crossing the road for a pedestrian, although this did not always amount to a phobia. Seventy-six per-cent (13) of those with PTSD expressed comments of concern about accident related activity and 41% (7) were still so affected at the end of the study.

To summarise, this study identified at least 21% of PTSD in subjects during the year following the road traffic accident. It also identified psychological consequences other than PTSD. Psychiatric disorder occurred in 35% of subjects during the year following the accident, depressive symptomatology of mild intensity and above in 19% and anxiety symptomatology amounting to clinical anxiety in 11%. Forty-nine per-cent of subjects expressed nervousness about accident related activities and in 21% this amounted to an accident related phobia.

In just under one fifth of those subjects who suffered PTSD psychiatric disorder, anxiety and depressive symptoms co-existed. In just under a half psychiatric disorder and depression were present and in just over a half psychiatric disorder was present.

Just under one half of subjects who suffered PTSD also suffered accident related phobias and nearly three-quarters expressed comments of nervousness about accident related activity.

Only one subject suffered the whole range of other psychological consequences examined in addition to PTSD.

This study supports the published literature that other psychological sequelae can occur following the trauma of a road traffic accident. It identified cases of psychiatric disorder, and symptoms of depression, anxiety and symptoms related to accident circumstances occurring post accident. These may take the form of co-

morbidity with PTSD but various combinations can occur. They may also occur independently. The natural course of other psychological sequelae was to improve over time, although, as with PTSD alone, it is possible to have a delayed onset or a chronic course.

4.3.5: <u>FACTORS PREDICTIVE OF POST-TRAUMATIC STRESS DISORDER</u>

This study offered an opportunity to examine factors that might influence the development of PTSD and might be of predictive value. It was of an exploratory nature on a small number of subjects and as such was not exhaustive. Nevertheless, it provided an interesting aspect to the study. Three possible candidate variables were identified, the Impact of Events Scale Total score, Group membership and consumption of alcohol prior to the accident. While the consumption of alcohol prior to the accident is an important factor, it is understandable in terms of the accident and does not increase our knowledge of predictive factors. The subject who consumed alcohol prior to the accident, if a driver or pedestrian, might be expected to sustain a more severe accident and subsequently become distressed about it. Impact of Events Scale score and Group Membership were identified as predictive factors for PTSD in this study. Age, sex, marital status, employment status, social class, past psychiatric history, family history of psychiatric illness, past road traffic accident, amnesia post accident and pre-accident personality, did not predict PTSD. Surprisingly, perceived threat to life at the time of the accident and injury severity score also did not predict PTSD. Those subjects who had higher scores on the Impact of Events Scale or those who were members of Group One (subjects admitted to hospital) were more likely to develop PTSD than those with a lower score on the scale or who were not admitted to hospital.

This study adds support to the findings of Malt (1988), Feinstein and Dolan (1991), Green *et al.*, (1993) and Shalev *et al.*, (1996) in relation to the lack of

predictive value for trauma severity. It also adds support to Feinstein and Dolan's findings of lack of predictive value for perceived threat to life at the time of the accident. It does not support Blanchard *et al.*, (1996) predictive value of the extent of injury and the development of PTSD.

Culpan and Taylor (1973) were unable to establish a relationship between frequency of neurotic complications following injury and the incidence of factors predisposing towards neurosis in the previous personality. Mayou *et al.*, (1993) found that post traumatic syndromes were not associated with a neurotic predisposition. This study examined previous personality and did not find any relationship between abnormal personality nor particular personality trait and PTSD.

Breslau *et al.*, (1991) found that prior trauma and PTSD sensitised an individual and made him more vulnerable when new trauma occurred. In addition, Blanchard *et al.*, (1995) found that their subjects were more likely to have a lifetime history of drug dependency and that previous suffering from PTSD was a risk factor and previous major depression and depression at the time of the accident predisposed to the development of PTSD. This study examined past psychiatric history and exposure to previous road traffic accidents but did not find these factors to be of predictive value.

This study also supported the findings in the literature regarding the predictive value of the Impact of Event Scale scores. Feinstein and Dolan (1991) found initial IES scores above the median predictive for PTSD. Green *et al.*, (1993) found higher scores on the IES in individuals who developed PTSD. Shalev *et al.*, (1996) found peritraumatic dissociation and initial scores on the IES were strongly associated with the later development of PTSD. Mayou *et al.*, also found post traumatic syndromes were strongly associated with horrific memories of the accident and did not occur in subjects who had been briefly unconscious and were amnesic for the accident.

There are no results in the literature with which to compare the predictive value of Group membership. The admission of subjects to hospital was intended to be

a measure of severity - admission denoting a more severe accident event. However, while group membership is a predictive factor, perceived threat to life at the time of the accident and severity of injury are not.

It would therefore appear to be some other factor about admission to hospital that is relevant. This might be the subject's perception of the traumatic event. While the IES scores and group membership are independent factors the mean score on the IES for those subjects admitted to hospital was significantly higher than the mean score for those not admitted to hospital. It might be that the subject's perception of the accident is of greater distress when hospital admission is involved. However, there was no control group of other hospital patients and one cannot rule out some interaction between admission to hospital and severity of injury.

The findings support the stressor criterion for PTSD that the severity of the event is indeed relevant. The more severe the event, as measured by membership of Group One, the more likely the subject is to develop PTSD. Severity of injury was not a predictive factor for developing PTSD. However, the IES proved to be a predictive factor. The predictive value of the IES would appear to suggest that it is the subject's impression of events that is important in determining the subject's likelihood of developing PTSD. This would not accord with the definition of the stressor criterion in the DSMIIR classification for PTSD that the magnitude of the event has to be ...."outside the range of human experience to be markedly distressing to anyone".

4.3.6: <u>LITIGATION AND POST-TRAUMATIC STRESS DISORDER</u>

(i)   <u>ACCIDENT RELATED SYMPTOMATOLOGY AND LITIGATION</u>

This study also offered the opportunity to document contact with litigation procedures for compensation claims for personal injury sustained in the road traffic accident. There has been much debate about the relationship of psychiatric symptoms to litigation since Miller (1961) presented his paper on Accident Neurosis on a sample

of head injury cases. Many authorities have contributed to both sides of the debate as evidenced in Chapter 1.2.5. Miller drew attention to the importance of compensation proceedings in perpetuating post traumatic symptoms......" The exploitation of his injury represents one of the few weapons available to the unskilled worker to acquire a larger share - or indeed share of any kind - in the national capital ".... This view predominated for many years. It was eventually challenged by among others Kelly (1971,1981) who refuted this. In his 1981 study, Kelly confirmed that patients suffering from Post-traumatic Neurosis after direct head injury do recover and return to work before litigation is settled. Tarsh & Royston (1985), in their follow up study on Accident Neurosis on accident victims with back or limb injuries without demonstrable organic pathology, found that few claimants had recovered one to seven years after compensation was received. Binder, Trimble and McNeil (1991), however, in their study on accident victims with psychological symptoms who were involved in litigation, suggested there was a better outcome the longer the time after resolution of the litigation and the shorter the time between injury and litigation, and hypothesised that the litigation process itself maintained or exacerbated psychological symptoms. However, Mendleson (1995) found that 75% of litigants were not working nearly two years after finalisation of litigation. His studies led him to the conclusion that litigants were not ...."cured by a verdict".....

Most litigation takes place and is concluded some considerable time after the accident. However, initial contact with the legal services can be expected to take place within a reasonable time of the accident. This study found that accident related symptoms decreased over the course of the study, although nearly half of those subjects remaining in the study at one year still suffered such symptoms. The majority of subjects making contact with the legal services had done so by six months.

At one year, of those whose claims for compensation for personal injuries had not been resolved, over half (57% - 4) still experienced accident related symptoms and one third (32% - 7) of those whose claim was ongoing were symptom free. Thirty-five per cent (10) of claimants had suffered from PTSD. The claim had been settled in 1

out of the 10 cases at this stage. Nevertheless, PTSD had resolved in over half (60%) at the end of the study, although all still suffered ongoing accident related symptoms.

This study found that subjects did make contact with litigation procedures for compensation claims for accident related symptomatology following road traffic accidents. No significant differences were identified between Group One (those subjects who were admitted to hospital) and Group Two (those subjects not admitted to hospital) in this respect. No significant differences for accident related symptoms were identified between those whose claim was resolved and those whose claim was ongoing.

This study would suggest support for the view in the literature that accident related symptomatology is not influenced by seeking compensation. Some subjects did recover or improve before compensation proceedings were completed and some did continue to experience symptoms after claims were resolved. However, these findings apply to the first year following the accident and to the sample remaining at one year. No details were available for those who defaulted from the study. Those findings might have influenced the picture. Litigation can take several years before conclusion and it is possible that the picture could change during that time. The findings of this study must, therefore, be interpreted as indicative rather than conclusive. It would be of interest to pursue this aspect of the study in further depth over a more prolonged post accident period.

(ii)   <u>DIAGNOSTIC BASIS FOR PTSD FOR THE PURPOSES OF</u>
<u>SEEKING COMPENSATION</u>

Most accidents are common events and are very disruptive to health, social, occupational, family and financial aspects of life. There has been a proliferation of claims for personal injury for PTSD in recent years. To be successful a claimant must suffer from a recognisable mental illness arising from a cause. The majority of cases are settled out of Court, without the need for an expert witness to appear in Court, to be cross examined and to substantiate his opinion. It is important to reach a diagnosis.

As will be seen from the next section (4.4), it is relatively easy to reach a diagnosis using the ICD10 Clinical Version classification, for all that is required is there to be either repetitive, intrusive recollection or re-enactment of the event by memories, flashbacks, daytime imagery or dreams. The claimant's condition might have settled, but the process of attending for examination for report might have triggered re-experiencing phenomena during the time leading up to the report. At the time of the examination the claimant can report re-experiencing phenomena and a diagnosis can be made. This bears no reflection on the true degree of disability sustained. One can state in a Report in all honesty...."Post Traumatic Stress Disorder as classified in the Tenth Revision of the International Classification of Diseases under F43.1" is present. There is potential for undermining the credibility of the psychiatrist.

Adopting DSM111R criteria for diagnostic purposes in this context may alleviate the problem. Unfortunately, this classification in itself is less than ideal in these circumstances. The manual does include on page xxix ....."The clinical and scientific consideration involved in categorisation of these conditions as mental disorders may not be wholly relevant to legal judgments, for example, that take into account such issues as individual responsibility, disability, determination and competency"...... If symptoms do not fulfil the criteria for PTSD, an alternative diagnosis would appear to be an adjustment disorder. This must commence within three months and last no longer than six months. Further, re-experiencing phenomena would make this category unsuitable. The same problems would apply to the research version of the ICD10. Claimants, therefore, may be considerably disabled following an accident but do not fit into a diagnostic category to allow a claim to be made. Hoffman (1991) has suggested that a more suitable diagnosis would be psychological factors affecting physical condition. Another possibility is the ICD10 classification of other reaction to severe stress. Neither of these diagnoses carry the same weight as PTSD which is a diagnostic entity clearly related to the trauma that caused it and readily understood and accepted by legal and lay sources.

The stressor criterion can cause problems in whichever classification is adopted. Accidents can be minor events and not fulfil criterion A for DSM111R ..."an event outside the range of the usual human experience...markedly distressing to almost anyone" or for ICD10 ...." exceptionally threatening or catastrophic nature ...pervasive distress in almost anyone"..... However, this study set out to challenge this precept and demonstrated that a syndrome of PTSD can be identified when a subject is exposed to a traumatic event such as a road traffic accident even when the stressor criterion is not met. This is supported by the findings of Mayou *et al (1993)* for their whiplash group (PTSD 5%). It should be remembered that classifications are guidelines rather than instructions written in tablets of stone. Neal (1994) highlights the pitfalls of making a categorical diagnosis of PTSD in personal injury litigation.

The author suggests that the stressor criterion be redefined, with less importance being given to the severity. The presence of the stressor should be noted and the typical symptomatology of PTSD identified. ICD10 Clinical Version is not useful and can be actively misleading for legal purposes and in the main, this can be discarded in favour of ICD10 Research Version. However, the situation does arise where the victim is disabled and the majority of symptoms are present but insufficient to qualify for a diagnosis under this classification. In the interests of establishing a fair settlement of claim, this situation could be identified and specified as not reaching a diagnosis under ICD10 Research Version but reaching a diagnosis under ICD10 Clinical Version with a full description of the actual symptomatology and consequent disability sustained. This could then be assessed by an independent assessor or the Courts as appropriate.

4.4 : COMPARISON OF DIAGNOSTIC CLASSIFICATIONS FOR POST-TRAUMATIC STRESS DISORDER

The criteria used for diagnosing PTSD for the purposes of discussion and comparison with other studies was based on the Diagnostic and Statistical Manual of

Mental Disorders, American Psychiatric Association, 1987,(DSM111R). This is the American classification that has been used since the revision of the DSM111 in 1987. These criteria were adopted for discussion to be able to compare the results with those studies in the literature that have used the same criteria. A further revision, the DSM1V, was introduced in 1994.

Since 1992, however, a diagnosis of PTSD has been included in the Tenth Revision of the International Classification of Diseases and Related Health Problems. This classification is used in Britain, and PTSD is now commonly diagnosed in clinical and legal practice using this classification. There is both a Clinical and a Research version of this classification. It was of interest to compare the diagnoses of PTSD when each of these classifications were used.

DSM111R is a classificatory system based on a multiaxial classification. PTSD is coded under 309.89. (Appendix 8). The diagnostic criteria cover three symptom clusters (A being the stressor criterion) - (B) Re-experiencing phenomena, (C) Avoidance phenomena and (D) Increased arousal. To reach a diagnosis of PTSD one item from section B, three from section C and two from section D must be identified. The symptoms must have been present for at least one month.

There are two versions of the ICD10, one a clinical version that is more descriptive (Appendix 9), and one a research version with diagnostic criteria in the form of precise operational criteria (Appendix 10). Symptoms must be present within six months of the event. PTSD is coded under F43.1. For a diagnosis to be reached using the clinical version, symptoms of a repetitive intrusive recollection or re-enactment of the event must be present. Two other groups of symptoms are also identified one of which is often present (emotional detachment, numbness of feeling and avoidance), while the other, if present, contributes to the diagnosis (autonomic disturbances, mood disorder and behavioural abnormalities). For a diagnosis to be reached using the research version, however, the criteria are stricter in that there are four symptom clusters, and symptoms must be present in three of these groups, one

symptom re-experiencing the accident, one of avoidance and either two of arousal, or the presence of some amnesia for the accident.

It is possible to make a diagnosis of delayed onset PTSD. In DSM111R, delayed onset can be specified if symptoms are at least six months after the trauma. In ICD10 Clinical version, a probable diagnosis is possible if the delay between onset and event is longer than six months, provided that the clinical manifestations are typical and no alternative disorder is plausible. In the Research version, delayed onset of more than six months can be included but must be specified.

The diagnoses of PTSD throughout the course of the study were assessed. The observations made are detailed in Table 4.1 at the end of this chapter.

A diagnosis was made on fifty-five occasions. On only 27% of occasions it was possible to make a diagnosis on all three classification systems. On 55% of occasions PTSD could be identified by a restrictive measure. On 99% of occasions PTSD could be identified by a less restrictive, clinical measure and on 45% of occasions by that measure alone.

For ICD10 Clinical version criteria to be fulfilled, all that is required is for there to be either repetitive, intrusive recollection or re-enactment of the event by memories, flashbacks, daytime imagery or dreams. Other features are either present often, or are contributory. This is a broad definition. Both DSMIIIR and ICD10 research version are more restrictive and more narrowly define exposure. It is possible to reach a diagnosis on either DSMIIIR or ICD10 Research version alone. They differ in that ICD10 Research version criteria include a section on actual or preferred avoidance of circumstances resembling or associated with the stressor, which has to be present for a diagnosis. There is also a section on recall of exposure in ICD10 Research version. Both of these items are present in section C of DSMIIIR, but in each case there is a potential for six other items to be present. However, unlike ICD10 Research version, three items are required to be identified within the section.

It seems surprising that a diagnosis can be reached on ICD10 Research version that is not sustained on ICD10 Clinical version, given its broad definition. However,

ICD10 Research version specifies one item in the first section denoting distress on exposure to circumstances resembling or associated with the stressor, whereas repetitive intrusive recollections or re-enactment of the event in memories, daytime imagery or dreams are specified in ICD10 Clinical version. This proved to be the case on one occasion, although it could be argued that this is a question of semantics as it is difficult to understand how one could become distressed under these circumstances, without recalling the circumstances of the event unless there was some avoidance or defence mechanisms active. It is of interest to note that in the case when a diagnosis was reached on ICD10 Research version criteria alone, a diagnosis of PTSD on all three criteria was made at the subsequent assessment.

The discrepancy between figures that can be obtained using more restrictive or broader criteria is disturbing. The figures for cases of PTSD so obtained during the course of this study varied from 18%(ICDR) and 21%(DSM), the restrictive measures, to 44%(ICDC), a broader measure. It seems sensible to suggest that the criteria used in reaching a diagnosis ought always to be defined for credibility and consensus of opinion. For clinical practice, ICD10, Clinical version criteria are useful for screening potential cases and for highlighting cases where distressing symptoms are present and treatment required but the more restrictive criteria required for a diagnosis are not fulfilled. DSM111R (or updated DSM1V) would seem to be appropriate for research, to allow comparison to be made with studies from other countries. ICD10 Research version criteria would be useful for defining post-traumatic stress disorder in legal practice.

4.5: CONCLUSION

This study identified Post-traumatic Stress Disorder following road traffic accidents and found it to be a common event, occurring in at least one fifth of the sample during the first year following the accident. It examined the severity of the event, and the results of the study supported the hypothesis that the severity of the

event is a relevant factor in the development of PTSD.The more severe the accident the more likely the subject was to develop PTSD. More than one third of subjects in the Group exposed to the more severe accident event developed PTSD. However, this study also identified PTSD in approximately one eighth of those subjects exposed to a relatively minor accident, during the first year following the accident. This did not accord with the definition of the stressor criterion in the DSMIIIR classification for PTSD where the magnitude of the event has to be ...."outside the range of human experience to be markedly distressing to anyone". Other psychological consequences were identified and can occur as co-morbid conditions with PTSD or independently. The study was also able to identify predictive factors for the development of PTSD. It found that admission to hospital and the subject's perception of the event - the subject's subjective distress as measured by the IES - were of importance in predicting PTSD. The study found that subjects did make contact with litigation procedures for compensation claims for accident related symptomatology. However, this symptomatology was not influenced by seeking compensation.

4.5.1:   CLINICAL IMPLICATIONS

Road traffic accidents are common events as indeed is the development of PTSD after a road traffic accident, as this study has demonstrated. Of even more importance is the demonstration that this condition can develop even after a relatively minor accident. Other psychological consequences are possible. The course of PTSD can become chronic. This study examined psychological consequences of road traffic accidents in a mixed urban and rural locality. This type of locality will be replicated many times throughout the U.K.

The development of PTSD and other psychological consequences after a road traffic accident can have quite severe disruptive effects upon many aspects of a victim's life. It can influence family, social and occupational spheres and have financial implications. The victim may become involved in litigious procedures. There is a cost

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to the health services. As accidents are widespread and not confined to one particular type of patient or area, the cost to the individual and the health services is diffuse and largely goes unrecognised. Much can be done to prevent this.

Recognition is important. Health care personnel, particularly those involved in Accident & Emergency departments, General Practice and the community should be educated and alerted to the psychological consequences of a road traffic accident, particularly to the fact that these can occur after relatively minor accidents. In most hospitals, psychiatrists are involved in the development of Major Accident Plans. It is generally recognised that adverse psychological consequences follow major disasters. The author submits that what now needs to be brought to general attention is that road traffic accidents, even those of a minor nature, can produce serious mental morbidity as well as physical morbidity. Psychiatrists have a role to play alongside Accident & Emergency staff and G.P's in the formulation of policies to handle victims of road traffic accidents.

Leaflets explaining possible consequences and containing simple advice ought to be prepared and distributed to all victims or their relatives in the Accident & Emergency department, at the time of the accident or made available in G.P.'s surgeries. Accident victims who are not followed up in hospital should be asked to report subsequently to their G.P's. The Impact of Events Scale would seem to be a useful device for screening to identify those people who are more likely to develop PTSD. This could be applied at hospital or G.P's surgery by a health care professional and those identified at risk could be further evaluated and supported.

Much of what is required is educational, making involved personnel and victims aware of possible consequences, making such consequences acceptable to the public and indicating the directions for obtaining assistance if required. Intervention by discussion with an informed source in the initial stages and referral to appropriate psychological services might prevent much morbidity in the long term. Any additional work load, or funding for extra personnel could be recouped in the long term from a decrease in the demand by more damaged victims on the health services.

4.5.2: __FUTURE DIRECTIONS FOR RESEARCH__

There is an undoubted need for much further research into the psychological sequelae of road traffic accidents. There needs to be an internationally recognised consensus of opinion among researchers about which classification and assessment procedures ought to be used, so that effective communications can take place and informative comparisons made.

As revealed by this thesis, existing diagnostic classifications for PTSD have not been entirely appropriate for the classification of PTSD following road traffic accidents, particularly minor accidents. The stressor criterion in particular has been inappropriate. This has been addressed to some extent, since the commencement of this thesis, by the introduction of DSM1V, the fourth revision of the Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association in 1994. This classification now defines the stressor criterion as ...."confronted actual or threatened death, serious injury or threat to physical integrity of oneself.....and to have responded with intense fear, helplessness or horror". This has removed the problem of the severity criterion of the stressor and allows for the victim's perception of the event to be taken into account. Apart from other refinements, DSM1V includes a criterion (F) that..."the disturbance causes clinically significant distress or impairment in social, occupational or other important areas of functioning". It also includes the concept of a chronic condition if the duration of symptoms last three months or more. Further research requires to be undertaken to assess the applicability of these criteria to the diagnosis of PTSD in relation to road traffic accidents.

Prospective longitudinal, unbiased studies are required to document the psychological consequences to subgroups of accident victims, to evaluate psychological consequences other than PTSD, and to examine further the natural course of the condition over a longer period of time and to identify risk factors for chronic conditions. The effect of treatment and prevention strategies needs to be examined. The study reported in this thesis could be further extended to examine the

course of PTSD over a longer period of time and examine in more detail predictive factors in outcome for PTSD and the relationship of PTSD with litigation including the evaluation of the relationship of the diagnosis of PTSD, with level of impairment and the award of fair and reasonable damages in civil litigation.

There is a paucity of research in this area to date and the pervasive consequences of a common event to the individual and society are great. The whole area needs to be better defined, and better understood, in particular the variations of the condition and the effectiveness of intervention.

TABLE 4 . 1

COMPARISON OF DIAGNOSTIC CLASSIFICATIONS FOR PTSD

A diagnosis of PTSD was made on 55 occasions

On 15 occasions, a diagnosis was reached using all three classificatory systems.

On 25 occasions, a diagnosis was reached using ICDC alone.

On 1 occasion, a diagnosis was reached using ICDR alone

On no occasion, was a diagnosis reached on DSM alone

On 9 occasions, a diagnosis was reached on DSM and ICDC

On 5 occasions, a diagnosis was reached on ICDR and ICDC

APPENDIX 1:

<u>DSM 1 (APA, 1952) DIAGNOSTIC CRITERIA FOR PTSD</u>

<u>TRANSIENT SITUATIONAL PERSONALITY DISORDER</u>

000-x81   <u>GROSS STRESS REACTION</u>

Under conditions of great or unusual stress, a normal personality may utilize established patterns or reaction to deal with overwhelming fear. The patterns of such reactions differ from those of neurosis or psychosis chiefly with respect to clinical history, reversibility of reaction, and its transient character. When promptly and adequately treated, the condition may clear rapidly. It is also possible that the condition may progress to one of the neurotic reactions. If the reaction persists, this term is to be regarded as a temporary diagnosis to be used until a more definitive diagnosis is established.

This diagnosis is justified only in situations in which the individual has been exposed to severe physical demands or extreme emotional stress, such as in combat or in civilian catastrophe (fire, earthquake, explosion etc.). In many instances this diagnosis applies to previously more or less " normal " persons who have experienced intolerable stress.

The particular stress involved will be specified as (1) Combat or (2) Civilian catastrophe.

APPENDIX 2:

<u>DSM 11 (APA, 1968) DIAGNOSTIC CRITERIA FOR PTSD</u>

307.3 <u>ADJUSTMENT REACTION OF ADULT LIFE</u>

Example: Resentment with depressive tone associated with an unwanted pregnancy and manifested by hostile complaints and suicidal gestures.

Example: Fear associated with military combat and manifested by trembling, running and hiding.

Example: A Ganser syndrome associated with death sentence and manifested by incorrect but approximate answers to questions.

APPENDIX 3:

DSM111 (APA, 1980) DIAGNOSTIC CRITERIA FOR PTSD

A. Existence of a recognisable stressor that would evoke significant symptoms of distress in almost anyone.

B. Re-experiencing of the trauma as evidenced by at least one of the following:
    (1) recurrent and intrusive recollections of the event.
    (2) recurrent dreams of the event.
    (3) sudden acting or feeling as if the traumatic event were recurring, because of an association with an environmental or ideational stimulus.

C. Numbing of responsiveness to or reduced involvement with the external world, beginning some time after the trauma, as shown by at least one of the following:
    (1) markedly diminished interest in one or more significant activities.
    (2) feeling of detachment or estrangement from others
    (3) constricted affect.

D. At least two of the following symptoms that were not present before the trauma:
    (1) hyperalertness or exaggerated startle response.
    (2) sleep disturbance.
    (3) guilt about surviving when others have not, or about behaviour required for survival.
    (4) avoidance of activities that arouse recollection of the traumatic event.
    (5) intensification of symptoms by exposure to events that symbolise or resemble the traumatic event.

Subtypes:
    A. Acute: onset of symptoms within 6 months of the trauma or duration of symptoms of less than 6 months.

    B. Chronic or delayed: duration of symptoms of 6 months or more (chronic), or onset of symptoms at least 6 months after the trauma (delayed).

DSM111R (APA, 1987) DIAGNOSTIC CRITERIA FOR PTSD

309.89

A.   The person has experienced an event that is outside the range of usual human experience and that would be markedly distressing to almost anyone, e.g. serious threat to one's life or physical integrity ; serious threat or harm to one's children, spouse, or other close relatives or friends; sudden destruction of one's home or community; or seeing another person who has recently been , or is being seriously injured or killed as a result of an accident or physical violence.

B.   The traumatic event is persistently reexperienced in at least one of the following ways:

(1) recurrent and intrusive distressing recollections of the event (in young children repetitive play in which themes or aspects of the trauma are expressed).

(2) recurrent distressing dreams of the event.

(3) sudden acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative (flashback) episodes, even those that occur upon awakening or when intoxicated).

(4) intense psychological distress at exposure to events that symbolise or resemble an aspect of the traumatic event, including anniversaries of the trauma.

C.   Persistent avoidance of stimuli associated with the trauma or numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following:

(1) efforts to avoid thoughts or feelings associated with the trauma.

(2) efforts to avoid activities or situations that arouse recollections of the trauma.

(3) inability to recall an important aspect of the trauma (psychogenic amnesia).

(4) markedly diminished interest in significant activities (in young children, loss of recently acquired developmental skills such as toilet training or language skills).

(5) feelings of detachment or estrangement with others.

(6) restricted range of affect, e.g. unable to have loving feelings.

(7) sense of a foreshortened future, e.g. does not expect to have a career, marriage, children or a long life.

D.   Persistent symptoms of increased arousal (not present before the trauma), as indicated by at least two of the following:

(1) difficulty falling or staying asleep.

(2) irritability or outbursts of anger.

(3) difficulty in concentrating.

(4) hypervigilance.

(5) exaggerated startle response.

(6) psysiological reactivity upon exposure to events that symbolize or resemble an aspect of the traumatic event (e.g. a woman who was raped in an elevator breaks out in a sweat when entering any elevator).

E.   Duration of the disturbance (symptoms in B, C and D) of at least one month.
Specify delayed onset if onset of symptoms was at least 6 months after the trauma.

APPENDIX 5:

ICD10 (WHO, 1992) DIAGNOSTIC CRITERIA FOR PTSD

F43.1   **CLINICAL VERSION**

Diagnostic Guidelines

This disorder should not generally be diagnosed unless there is evidence that it arose within 6 months of a traumatic event of exceptional severity. A "probable" diagnosis might still be possible if the delay between the event and the onset was longer than 6 months, provided that the clinical manifestations are typical and no alternative identification of the disorder (e.g. as an anxiety or obsessive -compulsive disorder or depressive episode) is plausible. In addition to evidence of trauma, there must be repetitive, intrusive recollection or re-enactment of the event in memories, daytime imagery, or dreams,. Conspicuous emotional detachment, numbing of feeling, and avoidance of stimuli that might arouse recollection of the trauma are often present but are not essential for the diagnosis. The autonomic disturbances, mood disorder, and behavioural abnormalities all contribute to the diagnosis but are not of prime importance.

APPENDIX 6:
ICD10 (WHO, 1992) DIAGNOSTIC CRITERIA FOR PTSD

F43.1   RESEARCH VERSION

A.   The patient must have been exposed to a stressful event or situation (either short- or long- lasting) of exceptionally threatening or catastrophic nature, which would be likely to cause pervasive distress in almost anyone.

B.   There must be persistent remembering or "reliving" of the stressor in intrusive "flashbacks", vivid memories, or recurring dreams, or in experiencing distress when exposed to circumstances resembling or associated with the stressor.

C.   The patient must exhibit an actual or preferred avoidance of circumstances resembling or associated with the stressor, which was not present before the stressor.

D.   Either of the following must be present:
(1) inability to recall, either partially or completely, some important aspects of the periods of exposure to the stressor.
(2) persistent symptoms of increased psychological sensitivity and arousal (not present before exposure to the stressor), shown by any two of the following:
>   (a) difficulty in falling or staying asleep.
>   (b) irritability or outbursts of anger.
>   (c) difficulty in concentrating.
>   (d) hypervigilance;
>   (e) exaggerated startle response.

E.   Criteria B, C, and D must all be met within 6 months of the stressful event or the end of the period of stress. (For some purposes, onset delayed more than 6 months may be included, but this should be clearly specified.

APPENDIX 7:

<u>DSMIV (APA, 1994) DIAGNOSTIC CRITERIA FOR PTSD</u>

309.81

A.   The person has been exposed to a traumatic event in which both of the following were present:

(1) the person experienced, witnessed or was confronted with an event or events that involved actual or threatened death or serious injury, or threat to the physical integrity of self or others.

(2) the person's response involved intense fear, helplessness, or horror. Note: in children, this may be expressed instead by disorganised or agitated behaviour.

B.   The traumatic event is persistently reexperienced in one (or more) of the following ways:

(1) recurrent and intrusive distressing recollections of the event, including images, thoughts or perceptions. Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.

(2) recurrent distressing dreams of the event. Note: in children there may be frightening dreams without recognizable content.

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

(4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

(5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

C.   Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

(1) efforts to avoid thoughts, feelings or conversations associated with the trauma.

(2) efforts to avoid activities, places or people that arouse recollections of the trauma.

(3) inability to recall an important aspect of the trauma.

(4) markedly diminished interest or participation in significant activities

(5) feeling of detachment or estrangement from others

(6) restricted sense of affect (e.g. unable to have loving feelings)

(7) sense of a foreshortened future (e.g. does not expect to have a career, marriage, children or a normal life span)

D.   Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following.

(1) difficulty falling or staying asleep

(2) irritability or outbursts of anger

(3) difficulty concentrating

(4) hypervigilance

(5) exaggerated startle response.

E.   Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month

F.   The disturbance causes clinically significant distress or impairment in social, occupational or other important areas of functioning.

Specify if

Acute: if duration of symptoms is less than 3 months

Chronic: if duration of symptoms is 3 months or more.

Specify if:

With Delayed Onset : if onset of symptoms is at least 6 months after the stressor.

APPENDIX 8:

HARTLEPOOL HA

N

A19

A689

A177

BILLINGHAM

A19

NORTH TEES
GENERAL HOSPITAL

HARDWICK

RIVER TEES

STOCKTON

MIDDLESBROUGH

A174

SOUTH TEES

A66

THORNABY

To Darlington

NORTH TEES HA

TEESSIDE
AIRPORT

EAGLESCLIFFE

YARM

A19

NORTHALLERTON HA
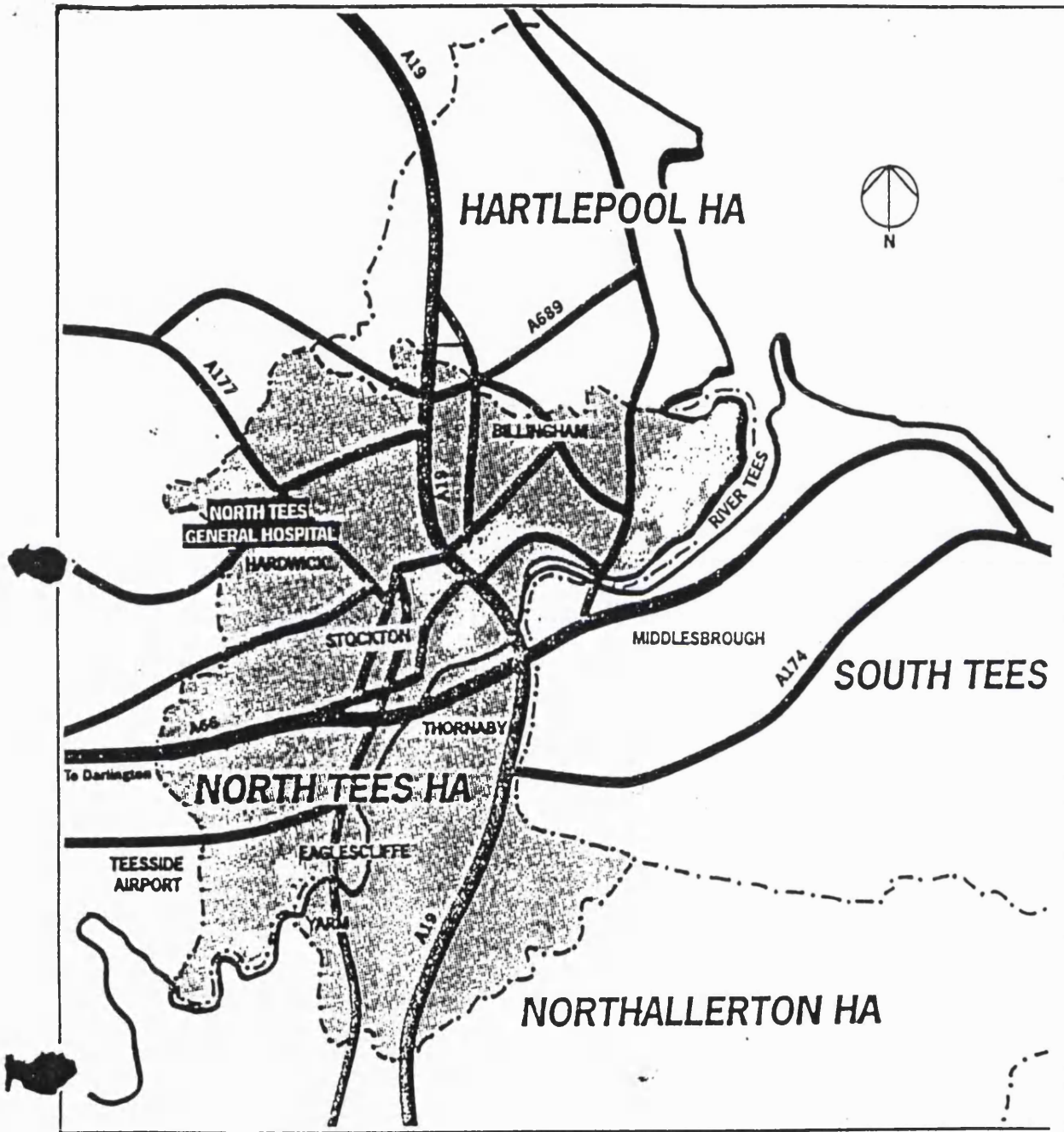
NORTH TEES HEALTH DISTRICT

ROAD TRAFFIC ACCIDENTS

Telephone No

Name	Address	Unit No.	Age	Disposal

To be completed daily and returned to Dr. M. Smith

APPENDIX 10:

ABBREVIATED INJURY AND INJURY SEVERITY SCORE

Outline of Scoring Chart - possible injuries are listed in each area

A.I.S. score	1	2	3	4	5
	Minor	Moderate	Severe not life threatening	Severe life threatening	Critical survival uncertain
External					
Head (includes face)					
Neck					
Thorax					
Abdomen Pelvic contents					
Spine					
Extremities bony pelvis					

A.I.S. 6 Maximum injury - Automatically assigned I.S.S. 75

LD_{50} - Age (in years)   I.S.S.
       15 - 44   40
       45 - 64   29
       over 65   20

I.S.S.

I.S.S. Body Region	A.I.S. score	Squared
Head /Neck	....	....
Face	....	....
Chest	....	....
Abd/Pelvic contents	....	....
Extremities/Pelvic Girdle	....	....
External	....	....

I.S.S. (sum of squares of 3 most severe only) .... LD_{50}

APPENDIX 11:

STANDARDISED ASSESSMENT OF PERSONALITY (ICD10)

Examples from each section are given below:-

The following probes should be asked verbatim with no further explanation until they have been completed:-

1. How does he/she get on with other people?
2. Does he/she have many friends?

Key words

A	B
Suspicious	Cold
Sensitive to rebuffs	Aloof
Bears grudges	Eccentric
Self-important	Lives in own world
Blames others	Loner
Defends rights	Unemotional

Note   The interviewer must check that the traits below are durable and extend into different areas of the patient's life. If so they are ticked. It must also be determined whether the constellation of traits:-

        1) Causes considerable personal distress
        2) Causes significant occupational impairment
        3) Causes significant social impairment

A   ---Sensitive to setbacks and rebuffs?----Unforgiving of slights and injuries?......Suspicious of other people and tends to see their actions as hostile?......Strong sense of his/her rights, out of keeping with the actual situation?.....Can be extremely jealous without good reason?.....Feels very self-important and thinks other people are especially interested in him/her......Often preoccupied with the idea that people conspiring against him/her without good reason?.....

PERSONALITY CATEGORY	GOODNESS OF FIT	HANDICAP		
		PERS/DIST	OCC/IMP	SOC/IMP
A. PARANOID	....	....	....	....

APPENDIX 12:

<u>REVISED IMPACT OF EVENT SCALE</u>

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

FREQUENCY

_____

Not at all   Rarely Sometimes Often

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

Intrusion subset = 1,4,5,6,10,11,14; Avoidance subset = 2,3,7,8,9,12,13,15

REVISED CLINICAL INTERVIEW SCHEDULE
CISR

INTRODUCTION

I would like to explain a few things about the interview.
- Firstly, it has been designed to assess your general health and well being for research purposes.
- It mainly asks about the PAST WEEK, by that I mean the SEVEN DAYS since last_____.
-The questions have already been written out so it will not sound like a normal interview and some questions may be somewhat inappropriate for you.
-Finally, all answers will be kept confidentially.

Example of one set of questions:- Phobias section

PHOBIAS
Some people get nervous or uncomfortable about specific things or situations even if there is no real danger, for instance:

speaking or eating in front of strangers

the sight of blood   Heights

crowded shops   being far from home

spiders

Are YOU nervous or anxious about any specific things or situations?

_____

Code type of phobia: Which of these makes you MOST nervous or anxious?

1. Travelling alone by bus or train, being far from home, enclosed spaces, being in crowds e.g. crowded shops, being alone in the house.
2. Eating, speaking in front of strangers, being watched or stared at, any social situation.
3. The sight of blood.
4. Insects, spiders or animals. Enclosed spaces or heights, any specific single cause.
5. None of these.

How many times in the past seven days have you felt nervous or anxious about [the situation/thing]?

None: skip next question, go to AVOIDANCE

0 < = 3 times

1 > = 4 times

Did you have ANY of the following symptoms?

heart racing or pounding   hands sweating or shaking

feeling dizzy   difficulty in getting breath

butterflies in the stomach   dry mouth

0 No

1 Yes

AVOIDANCE:

In the past week have you avoided [the situation/thing] because of your fear?

        0 No

        1 Yes

How many times have you avoided [the situation/thing] in the PAST SEVEN DAYS?

        0 < = 3 times

        1> = 4 times

APPENDIX 14:

THE GENERAL HEALTH QUESTIONNAIRE

.......We should like to know if you have had any medical complaints and how your health has been in general, *over the past few weeks*. Please answer ALL the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those you had in the past.......

Examples of questions from the four sections of the questionnaire are given below:-

Have you recently

A1 - been feeling perfectly well and in good health?	Better than usual	Same as usual	Worse than usual	Much worse than usual
B1 - lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
C1- been managing to keep yourself busy and occupied	More so than usual	Same as usual	Rather less than usual	Much less than usual
D1 - been thinking of yourself as a worthless person	Not at all	No more than usual	Rather more than usual	Much more than usual

APPENDIX 15:

<u>PTSD SYMPTOM CHECK LIST - DSM111R</u>

Accident:-   Date:-

Questions refer to the past seven days - answers yes or no

B.1.   Have upsetting memories of the accident frequently pushed
       themselves into your mind at times?   ....

  2.   Have you had recurring unpleasant dreams about the accident   ....

  3.   Have you suddenly acted or felt as if the accident was happening
       again ? (This includes flashbacks, illusions, hallucinations even if
       they occur when waking up or if intoxicated)   ....

  4.   Have things that reminded you of the accident upset you a great
       deal? (including anniversaries)   ....

C.1.   Have you ever tried to avoid thinking about the accident or
       feelings you associate with it?   ....

  2.   Have you sometimes tried to avoid activities or situations that
       remind you of the accident?   ....

  3.   Have you sometimes found you could not remember important
       things about the accident?   ....

  4.   Have you lost a lot of interest in things that were important to you
       before the accident?   ....

  5.   Have you felt more cut off emotionally from people than you
       did before the accident?   ....

  6.   Have there been times when you felt that you did not express
       your emotions as much or as freely as you did before the accident? ....

  7.   Have you felt since the accident that you will not have much of a
       future, a career, a happy family life or a good long life?   ....

D.1   Have you had more difficulty falling asleep or staying asleep than
       you did before the accident?   ....

  2   Have you become more irritable or lost your temper more since
       the accident?   ....

  3.   Have you had more difficulty in concentrating than you had before
       the accident?   ....

4. Have there been times since the accident when you were more alert
   or aware of sounds and noises than you were before the accident? ....

5. Do you startle more easily than you did before the accident ? ....

6. Do things which remind you of the accident make you sweat, tense
   up, become breathless or tremble? ....

A.
B.
C.
D.

APPENDIX 16:

<u>PTSD SYMPTOM CHECK LIST - ICD 10 CLINICAL VERSION</u>

Accident:-   Date:-

Questions refer to the past seven days.   Answers yes or no
Answers from DSM111R check list entered as appropriate

Y.3.5   Have you been aggressive, fearful or panicked in response to
        reminders of the accident?   ....

Z.2.   Have you been depressed since the accident?   ....
        Have you felt that life is not worth living?   ....
        Have you been anxious?   ....

Z.3.   Have you been drinking more than you used to before the accident? ....
        Have you been taking more drugs than usual?   ....

X.   <u>Diagnosis</u>   DSM111R
responses
   1.   Repetitive, intrusive recollection B1
   2.   Re-enactment of event
                    - memories, "flashbacks" B1/3
                    - daytime imagery B3
                    - dreams B2

Y.   <u>Often Present</u>
   1.   Conspicuous emotional detachment
                    - emotional blunting C5
                    - detachment from people C6
                    - unresponsiveness to surroundings C4
   2.   Numbness of feeling C6
   3.   Avoidance of stimuli
                    - recollection of trauma C1
                    - activities/situation C2
                    - avoidance of cues C2
                    - acute fear, panic or aggression with cues   ....

Z.   <u>Contributory</u>
   1.   Autonomic disturbances
                    - hyperarousal D2
                    - hypervigilance D4
                    - enhanced startle reaction D5
                    - insomnia D1
   2.   Mood disorder
                    - anxiety   ....
                    - depression   ....
                    - suicidal ideation   ....

3. Behavioural abnormalities
               - drugs   ....
               - alcohol   ....

X.

Y.

Z.

APPENDIX 17:

PTSD SYMPTOM CHECK LIST - ICD10 RESEARCH VERSION

Accident:-   Date:-

Questions refer to the past seven days.   Answers yes or no
Answers from DSM111R and ICD10 Clinical Version entered as appropriate

R1.	Flashbacks	B3	....
	Vivid memories	B1	....
	Recurring dreams	B2	....
	Distress on exposure circumstances	B4	....
	resembling stressor	D6	....
		Y5	....
R2.	Actual/preferred avoidance circumstances resembling associated with stressor	C2	....
R3	(a) Insomnia	D1	....
	(b) Irritability/outbursts anger	D2	....
	(c) Concentration	D3	....
	(d) Hypervigilance	D4	....
	(e) Exaggerated startle response	D5	....
R4.	Partial/complete recall some important aspects of exposure	C3	

APPENDIX 18:

<u>BECK DEPRESSION INVENTORY</u>

Examples from the 21 sets of questions and the score for each answer is given below.

	<u>Score</u>	<u>Question</u>
a.	0	I do not feel sad.
	1	I feel sad.
	2	I am sad all the time and I can't snap out of it.
	3	I am so sad or unhappy that I can't stand it.
b.	0	I am not particularly discouraged about the future.
	1	I feel discouraged about the future.
	2	I feel I have nothing to look forward to.
	3	I feel that the future is hopeless and that things cannot improve.
c.	0	I do not feel like a failure.
	1	I feel I have failed more than the average person.
	2	As I look back on my life, all I can see is a lot of failures.
	3	I feel I am a complete failure as a person.

APPENDIX 19:

SPEILBERGER STATE-TRAIT ANXIETY INVENTORY

Examples of the questions are given below:-

STAI Form Y-1

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel calm....................................	1	2	3	4
2. I feel secure................................	1	2	3	4

STAI Form Y-2

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	Almost never	Sometimes	Often	Almost always
21. I feel pleasant.........................	1	2	3	4
22. I feel nervous and restless.......	1	2	3	4

ASSESSMENT SCHEDULE

AREAS ASSESSED	ENTRY (Within 7 days of accident)	SIX WEEKS	SIX MONTHS	ONE YEAR
Socio-demographic characteristics				
- General	Full details	Change in circumstances		
- Specific to accident	Full details	Further details including Accident related activity		
Trauma characteristics	Full details including AIS ISS	Further details including Accident related symptoms	As for six weeks plus	As for six months
			Contact with legal services	
Psychological characteristics	CISR GHQ IES SAP	CISR GHQ IES DSM111R ICD10CV ICD10RV BDI STAI(STAIT/STAIS)		

GLOSSARY

PTSD	-	Post Traumatic Stress Disorder
DSM	-	Diagnostic and Statistical Manual of Mental Disorders
ICDC	-	International Classification of Diseases - Clinical Version
ICDR	-	International Classification of Diseases - Research Version
AIS	-	Abbreviated Injury Score
ISS	-	Injury Severity Score
CISR	-	Revised Clinical Interview Schedule
GHQ	-	General Health Questionnaire
SAP	-	Standardised Assessment of Personality
IES	-	Impact of Events Scale
BDI	-	Beck Depression Inventory
STAIS	-	Speilberger State Anxiety Inventory
STAIT	-	Speilberger Trait Anxiety Inventory

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