Posttraumatic Stress Disorder and Its Impact on the Economic and Health Costs of Motor Vehicle Accidents in South Australia

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Background: Motor vehicle accident studies thus far have focused primarily on psychiatric consequences and outcomes and medicolegal and treatment aspects, particularly of posttraumatic stress disorder (PTSD). This study aimed to determine the impact of motor vehicle accident–related psychiatric disorders on health and economic costs in quantitative terms.

Method: Of the 3088 victims of motor vehicle accidents who made a claim through the State Insurance Commission, South Australia, between November 27, 1996, and March 23, 1999, 391 responded to the study and were assessed using the 28-item General Health Questionnaire, the PTSD Checklist-Civilian Version, and the Dissociative Experiences Scale. At the end of the study period, computerized cost records and accounting data on the health and economic costs incurred were obtained for each of the subjects.

Results: The total health and economic cost in Australian dollars for the 391 motor vehicle accident victims was A$6,369,519.52. At about 9 months after the accident, of the 391 subjects who replied to the questionnaires, 31% were identified as depressed and 62% as anxious, while 29% met criteria for PTSD. PTSD cases incurred significantly higher health care costs compared with non-PTSD cases ($p < .001$). Untreated PTSD cases incurred significantly higher economic losses compared with treated PTSD and non-PTSD cases ($p < .05$).

Conclusion: The health and economic costs associated with motor vehicle accidents are enormous. Psychiatric morbidity among victims was high, and motor vehicle accident–related PTSD significantly contributed to increased overall health care and economic costs.

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Involvement in motor vehicle accidents (MVAs) has become a widespread experience and is a major cause of morbidity and mortality in people below 30 years of age. The physical injury, psychological trauma, and social and economic disruption caused by MVAs far outweigh those caused by any other form of "accidental" injury and death, including war, in most parts of the world today. The World Health Organization has predicted that by the year 2020, road traffic accidents will have moved from a rank of 9 to a rank of 3 for the leading causes of disability resulting from disease or injury.[1]

A review of road traffic accidents in Australia reported that there were 17,512 road crashes in 1996, which resulted in 21,989 persons being hospitalized.[2] Of these individuals, 40% were younger than 25 years of age. In 1998, 1763 persons were killed in 1580 road crashes, with more than a third of the fatalities being individuals less than 25 years old.[3] These figures reflect the enormity of the problem and the associated physical as well as emotional pain and suffering caused by this kind of accident.

Morbidity associated with physical injuries and psychological consequences from car accidents has been studied by many over the last few years.[4–7] Most studies show that between 10% and 40% of survivors of serious MVAs may develop posttraumatic stress disorder (PTSD) either acutely or within a year of the MVA. Unfortunately, the psychological effects of such traumatic events often go unrecognized in a variety of clinical settings.[8] Green et al.[5] showed that a third of MVA victims had

clinically significant symptoms but had not been diagnosed or treated in any way despite the fact that their symptoms had been readily apparent from direct questioning during the initial hospitalization. This finding is important, as many studies have shown that PTSD can be a chronic problem for many people and sufferers experience greater levels of disability in the areas of physical health and social and occupational functioning.

Looking at psychiatric outpatients, Switzer et al.[9] found that patients suffering from PTSD utilized more mental health services than non-PTSD patients. Kessler et al.,[10] in the National Comorbidity Survey, also showed that PTSD is associated with nearly the highest rate of health service use, and, by implication, the highest per capita cost, of any mental illness. In addition, comorbid psychiatric conditions also add to the disability suffered by individuals with PTSD. Blanchard et al.[6] reported that among MVA survivors with PTSD, between 3% and 51% suffered from depression, while 3% to 21% were found to have anxiety disorders. Simon et al.[11] demonstrated that anxiety and depressive disorders are associated with markedly higher health care costs even after adjustment for medical comorbidity. Hence, comorbid conditions also add to the overall health care costs of PTSD sufferers.

Compared with the ever-growing literature on the mental and physical health effects of traumatic stress, research on the economic consequences of trauma is still limited. Available literature has examined associations between 4 types of trauma exposure and labor market outcomes, i.e., employment status, annual income, and occupational stability.[12] The types of trauma exposure studied were trauma related to the Holocaust, sexual and physical abuse in childhood, combat exposure, and trauma experienced by refugees. The results of these studies were consistent and showed that traumatic stress is associated with reduced labor market outcomes. However, confidence in drawing specific conclusions is low, as methodologically sophisticated research is lacking in this area. Thus far, none have looked at the impact of MVA-related PTSD on economic costs.

Investigations have focused primarily on the acute and chronic psychiatric consequences, long-term outcomes, and medicolegal and treatment aspects, particularly of PTSD, after an MVA. Health and economic costs of other psychiatric disorders such as schizophrenia and depression[11,13–15] on society have been shown to be exorbitant, but to our knowledge there has been no literature published to date looking specifically at the impact of MVA-related PTSD in quantitative terms.

In summary, given that current research findings indicate that (1) the prevalence of PTSD among MVA survivors is significant, but a proportion of them remain undiagnosed and hence untreated, (2) PTSD patients utilize more health care services and hence incur higher health care costs, and (3) the limited studies conducted to date suggest higher socioeconomic consequences as a result of PTSD, this article attempts to examine PTSD and quantify the impact of PTSD on health and economic costs among MVA victims in South Australia.

We aimed to show that (1) the prevalence of PTSD was high after MVAs, (2) the health and economic costs of PTSD sufferers were higher than those of individuals without PSTD, and (3) the health and economic costs of those with undiagnosed PTSD were higher than for those who were identified and treated.

METHOD

In South Australia, a Compulsory Third Party Insurance (CTP) premium is paid when a motor vehicle is registered. CTP provides compensation for injuries to the victims of road traffic accidents in which the owner or driver of a vehicle is at fault. Passengers' liability is also covered. The premium is collected by the Department of Transport, Registration and Licensing Office. The Motor Accident Commission (MAC) is the CTP insurer, and the State Insurance Commission, South Australia (SGIC) is the claims manager responsible for the processing of claims and the receipts of inquiries. The forms of compensation payments are as follows:

1. Health care expenses: costs of hospitalization, outpatient treatment costs, use of other health-related services, and any future care or treatment
2. Economic losses: loss of earning capacity as a result of the accident (past and future economic losses and loss of chance [loss of earning potential])
3. Legal costs: cost of legal representation, court fees, investigative fees, and reports relevant to court proceedings
4. Pain and suffering: any entitlement for pain and suffering is subject to minimum requirements; to qualify, the injured person's ability to lead a normal life must be significantly impaired for at least 7 days, or the person must have reasonably incurred medical expenses of at least A$2500
5. Voluntary services: costs incurred as a result of requiring assistance with self-care

Participants

Victims of MVAs were recruited through the SGIC and consisted of individuals who made a claim for compensation between November 27, 1996, and March 23, 1999. Assessments of interested subjects were carried out while they were still awaiting settlement of their claims. Computerized cost records, accounting data on the health and economic costs incurred, and the settled

amount received by each of the study subjects was obtained from SGIC at the end of the study period.

Inclusion Criteria

Potential subjects recruited through SGIC had a third-party claim in which the MAC held 75% of the liability. Subjects with a suspected fraud claim or with claims made more than a year after the date of the accident were excluded from the study. The cost of medical treatment claimed by each subject through SGIC did not exceed A$500,000.

All potential subjects were contacted by SGIC through a letter describing the study and inviting them to participate voluntarily. Informed consent was obtained from interested subjects. The Department of Psychiatry, Queen Elizabeth Hospital (Adelaide, Australia), then sent them a set of self-report measures consisting of a demographic questionnaire, the General Health Questionnaire (GHQ),[16] the PTSD Checklist-Civilian Version (PCL-C),[17] and the Dissociative Experiences Scale (DES).[18]

A total of 3088 letters were sent out by SGIC, and 391 subjects responded to the self-report measures. Settled amounts were obtained and analyzed for all of these subjects.

Table 1. Comparison of Demographics, GHQ, and DES Information Between Motor Vehicle Accident Victims With and Without PTSD

Variable	PTSD (N = 103)	No PTSD (N = 252)	p Value
Age, mean ± SD, y	38.59 ± 13.18	39.03 ± 13.05	NS
Married, %	42	46	NS
Employed full-time, %	24	16	NS
Completed high school, %	39	49	NS
Admitted to hospital, %	29	20	NS
On treatment with medications, %	74	43	< .001
Time since accident, mean ± SD, mo	8.81 ± 4.56	9.20 ± 4.17	NS
GHQ score, mean ± SD			
Total	18.79 ± 6.00	15.13 ± 5.12	< .001
Severe depression	3.13 ± 2.16	1.79 ± 1.40	< .001
Anxiety	5.19 ± 1.75	4.87 ± 1.46	NS
Somatic symptoms	5.02 ± 1.89	3.95 ± 2.05	< .001
Social dysfunction	5.82 ± 1.61	4.91 ± 1.8	< .001
DES score, mean ± SD			
Total	19.79 ± 14.66	7.59 ± 7.59	< .001
Absorption	257.42 ± 166.85	102.85 ± 109.55	< .001
Amnesia	89.39 ± 102.65	24.22 ± 40.56	< .001
Depersonalization	68.91 ± 98.17	15.46 ± 33.05	< .001

Abbreviations: DES = Dissociative Experiences Scale, GHQ = General Health Questionnaire, PTSD = posttraumatic stress disorder.

Self-Report Measures

The GHQ[16] is a self-administered 28-item screening test aimed at detecting psychiatric disorder in community settings. The instrument demonstrates high test-retest and split half-reliability and correlates highly with the Clinical Interview Schedule. It yields a sensitivity to detecting a psychiatric disorder ranging from 80.6% to 91% and a specificity for detecting a non-case of 73% to 94.1%.[16]

The PCL-C[17] is a rating scale for assessing PTSD that consists of 17 items that correspond to the DSM-IV symptoms of PTSD. It has a test-retest reliability of 0.96 and an internal consistency greater than 0.90 for each of the criterion B, C, and D symptoms. When compared with a standardized clinical interview (Structured Clinical Interview for DSM-III-R), a score of 50 on the PCL-C provided an optimally efficient cutoff score to indicate a diagnosis of PTSD (sensitivity, 0.82; specificity, 0.83; kappa, 0.64).[17]

The DES[18] is a 28-item scale measuring dissociative symptoms. The measures comprise 3 factors loading greater than 0.45 (amnesic dissociation, absorption and imaginative involvement, and depersonalization and derealization). Scores greater than 30 often indicate the presence of a dissociative disorder.[18]

Statistics

All statistical analyses were performed on a personal computer with the SPSS software package (SPSS Inc., Chicago, Ill.). All statistical tests were based on an alpha level of .05 (2-tailed). To control for type I error associated with multiple comparisons, a Bonferroni adjustment was applied to probability levels required for significance in the analysis of the data utilizing 1-way analyses of variance. To estimate psychiatric costs for the entire sample, we must allow for the selection bias due to 292 of the subjects using no psychiatric services. We used selection models with parameter estimation by maximum likelihood. Starting values for the estimation procedure were derived from the non-selection hazard (inverse of Mills' ratio) from a probit model. The analyses were performed using the heckman procedure of Stata (Stata Corporation, College Station, Tex.).

RESULTS

Demographics

Data were missing for 36 subjects, so 355 subjects were included in the analyses. The mean ± SD time between assessment and the date of the MVA was 9.1 ± 4.5 months. The mean age of the respondents was 39.11 ± 13.11 years; 246 were female, 160 were married, 170 had completed high school, and 193 were employed either full-time or part-time.

Psychiatric Morbidity

Analyses of data were carried out on the self-report measures. The mean GHQ score for this sample was 16.06 ± 5.56, and 262 respondents were identified as possible psychiatric cases using the recommended 4/5 cutoff (a score of 5 or greater can be indicative of an underlying psychiatric disorder). There were no sex differences on

Table 2. Comparison of Mean Health and Economic Costs in Australian Dollars Between Subjects With and Without PTSD

	PTSD (N = 103)		No PTSD (N = 252)		
Cost	Mean	SD	Mean	SD	p Value
Health costs					
Hospital					
Public	63.63	334.81	66.10	382.47	NS
Private	494.16	2042.61	297.83	1626.97	NS
Outpatients	212.30	835.32	232.85	1513.32	NS
Radiology	53.05	190.54	34.75	193.52	NS
Acupuncture	58.59	340.94	17.56	87.25	NS
Chiropractic	305.43	666.14	179.75	541.23	NS
Dental	15.22	118.28	201.24	2575.68	NS
Physiotherapy	1248.10	1233.59	1052.57	1144.94	NS
Massage	250.75	736.98	189.80	698.97	NS
Medical	2095.80	3603.56	998.67	1736.35	< .01
Psychiatric	1107.46	1986.32	138.81	660.58	< .001
Radiology	932.05	972.12	429.37	561.49	< .001
Pharmacy	107.68	300.42	55.11	147.48	NS
Ambulance	5.76	46.39	12.12	92.52	NS
Hydrotherapy	167.94	319.84	56.83	58.15	< .01
Occupational therapy	10.97	80.28	4.41	50.72	NS
Total future health costs	544.24	1496.75	413.74	2110.78	NS
Health costs total	7662.17	8858.62	4377.09	5881.98	< .001
Economic costs					
Economic loss	6718.30	25528.07	2877.91	9384.90	NS
Legal	3421.47	3548.32	1859.74	3226.32	< .001
Voluntary services	394.20	2958.11	141.48	481.93	NS
Pain and suffering	5452.53	7028.14	4717.27	6693.29	NS
Economic costs total	15592.29	32418.19	9454.92	16220.96	NS
Total costs	23254.46	34658.82	13832.00	18218.21	< .01

Abbreviation: PTSD = posttraumatic stress disorder.

the GHQ total score, and only the somatic symptoms subscale of the GHQ showed a significant difference ($t = –2.78$, $df = 315$, $p = .006$), with females scoring significantly higher than males. There was no significant sex difference for GHQ caseness.

At about 9 months after their accidents, 31% of the subjects were identified as depressed, and 62% were anxious. A cutoff of 50 or above on the PCL-C was used, with a score of 50 or above indicating PTSD, and 103 (29%) of the subjects (33 males, 70 females) were identified as having PTSD. Table 1 shows the demographics, mean GHQ total and subscale scores, and DES total and subscale scores according to PCL-C caseness (± 1 standard deviation). There were no significant differences between PTSD and non-PTSD subjects on any of the demographic variables except for medication usage ($\chi^2 = 30.14$, $df = 1$, $p < .001$). More PTSD subjects than expected were currently on medication treatment at assessment.

PTSD subjects were more likely to score significantly higher on the GHQ total score ($t = –4.87$, $df = 266$, $p < .001$), GHQ social dysfunction ($t = –3.86$, $df = 145$, $p < .001$), GHQ somatic symptoms ($t = –4.14$, $df = 308$, $p < .001$), and GHQ severe depression ($t = –6.44$, $df = 107$, $p < .001$). PTSD subjects also scored significantly higher on the DES total score ($t = –9.83$, $df = 106$, $p < .001$) and its subscales, absorption ($t = –9.72$, $df = 116$, $p < .001$), amnesia ($t = –8.26$, $df = 97$, $p < .001$), and depersonalization ($t = –7.38$, $df = 91$, $p < .001$). On the basis of the GHQ subscales (1/2 cutoff; a score of 1 or greater can indicate depression/anxiety), 62% of the PTSD subjects were identified as possibly having a case of depression, 75% possibly had a case of anxiety, and 55% could be classified as possibly having both.

Health and Economic Costs

SGIC was able to provide information on the settled amounts for all 391 respondents. Total health care cost for the 391 MVA victims was A$2,066,471.08, and the total economic cost was A$4,303,048.44. This translates to a staggering A$6,369,519.52 in total costs.

PTSD and health and economic costs. Table 2 presents the differences between PTSD and non-PTSD subjects with regard to health and economic costs in Australian dollars. For health costs incurred, PTSD subjects scored significantly higher on medical costs ($t = –2.96$, $df = 121$, $p < .01$), psychiatric costs ($t = –4.85$, $df = 111$, $p < .001$), radiology costs ($t = –4.92$, $df = 129$, $p < .001$), and hydrotherapy costs ($t = –3.37$, $df = 122$, $p < .01$). PTSD subjects also scored significantly higher on total health costs ($t = –3.48$, $df = 139$, $p < .001$) and overall total health care and economic costs ($t = –2.62$, $df = 125$, $p < .01$). There was also a small yet significant correlation between total health cost and total PCL-C score ($r = 0.17$, $p < .001$).

In terms of economic costs, there was a significant difference between PTSD and non-PTSD subjects only where legal costs were concerned ($t = –3.88$, $df = 172$, $p < .001$). A separate analysis also showed that the probability of a PTSD subject receiving treatment was 0.57. This implied that a PTSD subject had an average of 50% chance of receiving treatment.

PTSD, psychiatric treatment, and health and economic costs. Table 3 depicts the differences in health and economic costs between subjects who had PTSD and had received some psychiatric treatment according to insurance company records, subjects with PTSD who received no psychiatric treatment, and those who did not have PTSD and received no psychiatric treatment. Twenty-one victims who received psychiatric treatment but were judged not to have PTSD were omitted in this analysis.

A number of differences were found between the health costs; the PTSD case/psychiatric treatment group incurred significantly higher costs than both of the other groups on acupuncture ($F = 4.95$, $df = 2,333$; $p < .01$), chiropractic ($F = 5.72$, $df = 2,333$; $p < .01$), physiotherapy ($F = 3.77$, $df = 2,333$; $p < .05$), massage ($F = 6.59$, $df = 2,333$;

Table 3. Comparison of Health and Economic Costs in Australian Dollars for PTSD Subjects With Psychiatric Treatment, PTSD Subjects With No Psychiatric Treatment, and Subjects Without PTSD With No Psychiatric Treatment

	PTSD/Psychiatric Treatment (N = 59)		PTSD/No Psychiatric Treatment (N = 44)		No PTSD/No Psychiatric Treatment (N = 231)		
Costs	Mean	SD	Mean	SD	Mean	SD	p Value
Health costs							
Hospital							
Public	90.68	413.48	27.36	181.51	64.34	387.58	NS
Private	786.88	2644.84	101.66	431.81	306.54	1698.90	NS
Outpatients	167.97	898.56	271.75	748.18	186.33	1408.57	NS
Radiology	19.68	78.57	97.79	272.42	32.10	179.98	NS
Acupuncture	102.29	447.07	0.00	0.00	15.14	86.37	< .01
Chiropractic	433.60	817.60	133.57	313.30	167.40	518.84	< .01
Dental	22.54	153.38	5.40	35.80	217.52	2745.18	NS
Physiotherapy	1472.74	1311.13	946.90	1062.49	1037.89	1134.15	< .05
Massage	401.59	932.87	48.49	203.63	135.16	468.83	< .01
Medical	2698.83	4209.74	1287.18	2393.99	891.12	1293.66	< .001
Radiology	1139.41	1032.91	654.01	827.27	406.23	543.93	< .001
Pharmacy	162.35	384.09	34.36	74.15	48.14	124.10	< .001
Ambulance	7.63	58.57	3.25	21.59	13.80	98.63	NS
Hydrotherapy	190.80	355.67	137.28	265.24	44.19	120.02	< .001
Occupational therapy	19.15	105.70	0.00	0.00	5.03	54.11	NS
Total future health costs	763.59	1875.17	250.11	645.54	362.60	1926.32	NS
Health total	10393.95	10501.43	3999.11	3664.84	3928.50	5330.88	< .001
Economic costs							
Economic loss	4334.03	9669.79	9915.38	37436.20	2544.96	8459.18	< .05
Legal	4055.74	3418.04	2570.98	3579.85	1646.62	2527.03	< .001
Voluntary services	87.75	200.24	805.11	4516.76	137.49	489.80	< .05
Pain and suffering	5344.97	6859.56	5596.74	7325.57	4681.32	6539.75	NS
Economic costs total	13734.74	16422.79	18083.10	46022.27	8872.90	14684.27	< .05
Total costs	24128.69	19910.99	22082.21	48085.76	12801.40	16415.01	< .001

Abbreviation: PTSD = posttraumatic stress disorder.

$p < .01$), medical costs ($F = 15.32$, $df = 2,333$; $p < .001$), radiology ($F = 26.62$, $df = 2,333$; $p < .001$), pharmacy ($F = 8.92$, $df = 2,333$; $p < .001$), and total health cost ($F = 24.79$, $df = 2,333$; $p < .001$). Hydrotherapy cost was also significantly different ($F = 14.07$, $df = 2,333$; $p < .001$), with the no PTSD case/no psychiatric treatment group incurring significantly lower costs than the other 2 groups.

The PTSD case/psychiatric treatment group also incurred significantly higher legal costs than both of the other groups ($F = 17.18$, $df = 2,333$; $p < .001$), but lower costs for voluntary services ($F = 3.13$, $df = 2,333$; $p < .05$). On the other hand, the PTSD case/no psychiatric treatment group suffered significantly greater economic losses ($F = 4.08$, $df = 2,333$; $p < .05$), utilized significantly more voluntary services, and hence incurred higher total overall economic cost ($F = 7.08$, $df = 2,333$; $p < .05$).

Maximum likelihood selection models were used to adjust mean costs for psychiatric treatment for the selection bias. When only subjects with a diagnosis of PTSD were considered, the mean cost per subject of psychiatric treatment was A$1933 when selection was not taken into account, but A$2957 when selection was allowed for. Thus, subjects not presenting for psychiatric treatment might be expected to be a heavy cost burden were they to do so. There was no significant selection bias between those with PTSD and those without PTSD.

DISCUSSION

MVAs are probably the most common trauma experienced by individuals living in industrialized countries today. One of the major potential psychiatric consequences of MVAs is PTSD. Most studies show that the recovery rates from PTSD increase dramatically within the first 3 to 6 months.[4,6,19–21] Unfortunately, the recovery rates slow down greatly after 6 months, with many still experiencing symptoms that meet criteria for PTSD even after 1 year.[4,7,20] In fact, using lifetime PTSD diagnoses, Kessler et al.[10] found substantially longer remission times of at least 36 to 64 months. Our study showed that about 9 months after the accident, 29% of the MVA victims still met criteria for PTSD. Hence, our results not only support the findings of earlier PTSD studies but also reiterate the need for clinicians to be aware of the persistence of posttraumatic stress symptoms.

On the basis of the GHQ, high rates of depression (31%) and anxiety (62%) were found in our sample of MVA victims. Comorbidity with depression and/or anxiety disorders was about 55% in the PTSD group, with PTSD subjects being significantly more depressed (Table 1). Our comorbidity results were consistent with those found in MVA studies as well as general population surveys that investigated PTSD diagnoses resulting from any cause.[4–6,10,19,22] In addition, Kessler[23] found that comorbid

psychiatric disorders reflected greater severity and chronicity of PTSD. Hence, with regard to the prevalence of psychiatric disorders associated with MVAs, our results were consistent with earlier findings.

Despite the smaller sample size in our study compared with studies looking at the costs of depression and schizophrenia,[11,13–15] our results showed that health care costs were significantly higher in those subjects with PTSD than in subjects without PTSD (see Table 2). Our results reflect those found by Switzer et al.,[9] who showed that clients with PTSD utilized more outpatient and inpatient services and took a greater variety of prescription psychotropic medications than those without PTSD. Unfortunately, we do not have information on the types and severity of physical injuries suffered by these subjects. Hence, we are unable to comment about the effect of accident-related physical injuries and the development of PTSD. However, Ursano et al.[20] and Green et al.[5] found no association between injury-related variables and risk of PTSD, although earlier studies were inconclusive.

In our study, health care cost was incurred only if the subject was diagnosed to be suffering from an illness and was agreeable to assessment and/or treatment. About 40% of the subjects who met criteria for PTSD received no psychological or psychiatric treatment. By implication, these subjects have undiagnosed and/or untreated PTSD. It appears that subjects not presenting for psychiatric treatment might be expected to be a heavy cost burden were they to do so. They may have had more severe PTSD and more severe injuries (their total hospital costs were higher, as evidenced by the probit model). This is not entirely surprising, as Weisaeth[25] and Schwarz and Kowalski[26] have shown that some of the most severely affected victims decline to participate in investigations of the psychological impact of traumatic events. They suggest that victims' reluctance to participate may indicate avoidance of the reminders of the trauma and their distress at recalling the event. Unfortunately, we do not have information about the reasons for our subjects' not receiving psychiatric assessment or treatment. Perhaps for future studies, qualitative analyses could be done to investigate this important aspect when reviewing services for the treatment of PTSD.

The results of our study did not show significant differences in compensation for economic losses as well as for pain and suffering between those with and without PTSD (see Table 2). There were also no significant differences found for future care and treatment costs. We were surprised by our findings, because the PTSD subjects were clearly suffering from chronic PTSD, which for a significant number would persist and be emotionally and socially disabling. This prompted us to try and understand the mechanism by which insurance companies quantify these categories.

Currently, settled amounts for compensation are guided by rulings made in previous court proceedings. Calculations with regard to economic losses and future care and/or treatment are subjective and heavily biased toward physical impairment. Psychiatric disorders or psychological distress suffered as a result of an accident are usually deemed normal or limited in time and fully treatable with good recovery rates. Hence, little emphasis is placed on the emotional pain and suffering that may be incurred, and this is reflected in the lack of differences in the settled compensation between those who suffered from PTSD and those who did not.

In a study on the medicolegal aspects of road traffic accidents, Mayou[27] also found that the settled sums were usually no more than partial compensation for direct losses, with little recognition or compensation for effects on ambitions and quality of life. Despite extensive published literature in the area of PTSD, it appears that insurance companies and perhaps even the court system are still ignorant of the biopsychosocial impact of psychiatric disorders, particularly PTSD. We believe that there is an urgent need for health professionals outside the medical community to receive such psychoeducation, which would help to validate the extent of suffering experienced by the mentally ill. Hopefully, this would translate to a reduction in social isolation and stigma for sufferers.

Compared with an ever-growing literature on mental and physical health effects of traumatic stress, research on the economic consequences of trauma is still at an early stage of development, with fewer than 2 dozen published studies on this topic. As far as we are aware, no epidemiologic study prior to our study has yet examined, in quantitative terms, the economic and health care costs associated with a diagnosis of PTSD. In an important article on the National Comorbidity Survey, Kessler et al.[24] showed that PTSD was associated with nearly the highest rate of service use and, by implication, the highest per capita cost of any mental illness. Although our study is limited to MVAs in South Australia, we have found that MVA victims with PTSD incur, on average, more than 1.5 times the health care costs of those without PTSD (Table 2). As mentioned earlier, a significant number of PTSD sufferers were undiagnosed and hence untreated. Our study showed that this particular group of subjects incurred significantly greater economic cost, suffering higher economic losses through loss of work and utilizing significantly more voluntary services as compared with those who received treatment and those who did not suffer from PTSD and were receiving no psychiatric treatment (see Table 3). If they had received treatment, the actual health cost of PTSD would be even higher.

In addition, our study only looked at the point prevalence of PTSD. Ronis et al.[28] suggest that PTSD may be intermediate between schizophrenia and major depression in the episodic nature of its course. Their findings suggest that remissions are usually followed by relapse and do not indicate that the disorder has run its course. They believe

that any method of assessing persistence of PTSD which concludes that the condition is cured or in permanent remission on the basis of the absence of utilization of services or absence of symptoms for periods as long as a year is likely to be seriously biased; utilization, and presumably symptoms, appear likely to return in subsequent years. This would imply that the rate of PTSD might actually be higher among those injured in road accidents than most data would suggest.

The results of our study show that (1) the prevalence of PTSD was high after MVAs, (2) the health and economic costs of PTSD sufferers were higher than the costs of those who did not develop PTSD, and (3) the economic costs of those with undiagnosed PTSD were higher than for those with PTSD who were identified and treated. We hope that our study helps to highlight the enormous health and economic costs associated with MVAs, particularly with regard to PTSD. The high rate of PTSD at about 9 months after the accident indicates the potential chronicity of MVA-related PTSD and its subsequent impact on quality of life for the survivors. If the same attention were given to the mental health of MVA victims as to their physical health, much less pain and suffering would be experienced. Effective therapies exist and, if implemented, greatly reduce mental anguish. In all probability, early identification and effective treatment could provide significant financial and economic savings to the community. Therefore, the efforts of mental health clinicians and researchers need to be rapidly expanded, so that appropriate help for survivors becomes the norm rather than the exception.

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