Original Article

Post traumatic distress symptoms following spinal cord injury: a comparative review of European Samples

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Objective: To highlight any cross-cultural differences in the prevalence of post traumatic distress (PTD), and the type of coping strategies implemented following spinal cord injury (SCI).

Design: Cross-sectional questionnaire.

Setting: A spinal cord rehabilitation unit in the UK, and six Swiss and German (CH/DE) spinal injury centres.

Method: A total of 85 SCI individuals in the UK, and 71 in CH/DE were evaluated on levels of PTD using the Impact of Event Scale (IES), and depressive symptomatology using the Beck Depression Inventory or the Berne Questionnaire of Well-Being at up to 6 months postinjury. In addition, the coping strategies utilised by the two samples were assessed using the COPE measure.

Results: No significant difference between the two samples was noted with regard to levels of PTD determined by the total score on the IES, although there was a tendency for a higher rate in the UK. Approximately 20 and 10% of both samples scored above the clinical cutoff on the IES subscales of intrusion and avoidance, respectively. No significant difference was found to exist between the rate of PTD in the SCI CH/DE sample and the able-bodied sample in Switzerland. A lower prevalence of depression was noted in the CH/DE sample. The CH/DE sample scored higher on the use of positive reinterpretation and growth, suppression of competing activities, active and restraint coping, whereas the UK sample scored higher on the use of humour as a coping strategy. Overall, denial, focusing on and venting of emotions, mental disengagement and suppression of competing activities were associated with PTD.

Conclusion: No cross-cultural differences in the level of PTD seem apparent between the UK and CH/DE populations. Future research should focus on determining what protects individuals from developing PTD following SCI.

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Introduction

In the early stages following spinal cord injury (SCI), attention is predominantly focused on physical factors, with psychological and social factors being addressed later. However, following a severe injury, post-traumatic stress reactions¹ such as intrusion, avoidance and depression are to be expected, which may have a major impact on rehabilitation success.²

For individuals confronted with an SCI, it may be difficult to determine the actual traumatic experience at the core of their post-traumatic distress. It could be the

aetiology of the injury, such as a road traffic accident, or the loss of a loved one during the accident, or the loss of sensation and motor function which results, the loss of sexual functioning or change in body image.³ Furthermore, it could be living with the everyday fear of life-threatening secondary complications such as autonomic dysreflexia, or the requirement of life long medical management of acquired disability.⁴ Hence, in SCI, even injuries that are termed ‘nontraumatic’ by medical classification, such as SCI resulting from illness or surgery, will undoubtedly still have traumatic connotations. In support of this, post-traumatic stress disorder (PTD) has also been reported following many life-threatening illnesses, which may parallel the distress

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experienced following SCI, such as subarachnoid haemorrhage⁵ and cardiac arrest.⁶

However, just as it has been demonstrated that depression is not an inevitable consequence following SCI,⁷ so too has PTD.^{4,8} As noted by Breslau⁹ following a review of the literature, the conditional risk of developing PTD tends not to exceed 25% of those exposed to trauma. Consequently, rates of PTD following SCI have been found to vary from 12–17% in American veterans,³ to 33.3% in children and adolescents,⁴ and approximately 25% in people with paraplegia when viewed alone.^{10,11}

Hence, one must ask what differentiates those individuals who are affected from those who are not. How individuals assess and interpret a situation or event is a product of primary and secondary appraisal processes.¹² If an event is both motivationally relevant and incongruent, and the individual believes that they do not possess adequate coping resources to respond, appraisals of threat and loss may result.¹³ Therefore, individuals who do not perceive themselves to have adequate coping resources may be at greater risk of PTD. This is supported by research showing that the coping strategies implemented following SCI are more predictive of later anxiety and depression than age, gender, socioeconomic status or functional independence.¹⁴ Elfström *et al*¹⁵ found that sociodemographic and disability-related variables were weak predictors and that SCI-related coping remained the most important predictor of psychological outcome, for example, such as helplessness and intrusion.

There are of course no distinct boundaries between the concepts of 'coping', 'coping styles' and 'coping strategies'. It is suggested that during the first weeks after the onset of the SCI, positive situational coping strategies¹² are predominant, in a sense of the primary appraisal 'a catastrophe' and the secondary appraisal 'but I am still alive' which probably reinforces the powerful initial effect. Gradually, more trait-oriented coping styles¹⁶ emerge. They could be more critical, depending on the individual's personality and history, and could be responsible for diminishing the psychologically powerful, initial effect (see Figure 1).

Hypothesis 1: It is postulated that a creative adjustment process, characterised by a nonspecific mobilisation

of coping resources, often occurs right at the onset of SCI. When confronted with an SCI, the individual has to subject their life to a process of re-evaluation in order to establish a framework of comprehensibility, manageability and meaningfulness, resulting in a sense of coherence (SOC).¹⁷ It is proposed that this latter feature is responsible for driving the aforementioned mobilisation of coping resources. In the able-bodied population, SOC tends to remain at a fairly constant level throughout adulthood;¹⁸ therefore, one would expect to note a disparity in SOC levels between this population and one comprised of individuals with a disability. The average time of filling in the questionnaires for the CH/DE sample was $M = 33.79$ days after the SCI ($SD = 24.87$).

Hypothesis 2: It is predicted that there is no difference in the level of caseness between the English- and German-speaking patient samples with regard to PTD symptomatology and depression. If this is so, we only need to predict a significant difference between the German-speaking patient sample and the Swiss able-bodied sample with regard to PTD symptomatology in terms of intrusion and avoidance.

A further set of analyses was conducted to explore the disparity in coping strategies and to show what coping strategies, sociodemographic variables and injury parameters predicted intrusion and avoidance significantly.

The descriptive model depicted in Figure 1 illustrates the buffering effect which results from this change in SOC and the related coping repertoire, and hence is termed the 'air bag' effect, as this process serves to cushion the impact of any potentially stressful experience. The norm 'tube' represents the physical and psychological range of coping strategies implemented in everyday experience without suffering from a severe injury, whereas the dotted lines demonstrate the unspecific expansion of the repertoire which takes place after the onset of an SCI (☛), and its refining which occurs with time (*t*), experience and effort. Specifically, the lower arrow symbolises how one's physical ability (♿) is now different from that of the able-bodied population, but how over time with persistent work, it begins to approach a level where disability is minimised. In contrast, the upper arrow illustrates the mobilisation of coping resources (Ψ) which occurs to counteract the dramatic worsening of the physical condition. It is proposed that over time personal growth may occur as a result of the adjustment process, which allows the individual to have a good quality of life despite their physical condition.

This model may offer insight into why the overall rates of distress in this population are lower than one would perhaps expect, and secondly differentiate those who adjust well from those who do not.

Objectives of current study

The hypothesis that individuals with an SCI will differ from able-bodied individuals on the degree of SOC will be addressed. Furthermore, this study sought to

Figure 1 The air bag effect

determine whether cross-cultural differences exist between a British English and a German speaking sample as regards the prevalence of PTD following SCI. Cross-cultural discrepancies may be a consequence of differences between rehabilitation or emergency services, or may reflect cultural differences at an intrapersonal level as discussed above. Therefore, any difference in coping repertoire utilised by the two populations shall also be explored.

Materials and methods

Participants

The study group consisted of 85 individuals with an SCI at up to 6 months postinjury from the UK, and 71 from Switzerland and Germany (CH/DE). The UK sample was based at a spinal injuries rehabilitation unit and entailed all individuals admitted to the centre with a traumatic injury between 1990 and 1994, who were aged 16–64 years. Three Swiss centres were involved in the study, where individuals aged 16 years and above, with either traumatic or nontraumatic injuries participated. Owing to the relatively low numbers of accessible patients with SCI in Switzerland, data were also gathered from three German centers, which have comparable treatment standards ($n=17$), and again included patients with either traumatic or nontraumatic injuries who were aged over 16 years.

The Swiss/German (CH/DE) 6 month postinjury sample was also compared and contrasted with a reference group of 306 Swiss able-bodied people, which is representative of the Swiss population. Out of these 306 able-bodied individuals, a sample of $n=71$ was randomly selected to compare with the CH/DE sample ($n=71$). Unfortunately, there was no data available to do similar comparisons using the British data.

The demographics of the two groups at 6 months postinjury can be seen in Table 1. One can observe that the groups are not significantly different in terms of *Gender* UK ($m=80\%$, $f=20\%$) vs CH/DE ($m=73\%$, $f=27\%$) $\chi^2=0.318$, $df=1$, $P=0.345$ NS; *age categories* ($<25=38\%$, $25-55=55\%$, $>55=7\%$) vs CH/DE ($<25=32\%$, $25-55=52\%$, $>55=16\%$) $\chi^2=0.323$, $df=2$, $P=0.199$ NS; *injury level* UK (individuals with paraplegia = 59%, individuals with tetraplegia = 41%) vs CH/DE (individuals with paraplegia = 62%, individuals with tetraplegia = 38%) $\chi^2=0.09$, $df=1$, $P=0.765$ NS, but the groups differ significantly in terms of *Aetiology* UK (accident = 93%, no accident, eg, illness and others = 7%) vs CH/DE (accident = 66%, no accident, eg, illness and others = 34%) $\chi^2=17.457$, $df=1$, $P\leq 0.001$ and *completeness of paralysis* UK (individuals with complete paralysis = 70%, individuals with incomplete paralysis = 30%) vs CH/DE (individuals with complete paralysis = 44%, individuals with incomplete paralysis = 56%) $\chi^2=10.182$, $df=1$, $P=0.001$.

Table 1 Demographics of British (UK) and Swiss/German (CH/DE) 6 month postinjury samples and randomly selected Swiss able-bodied sample

	UK ($n=85$) (%)	CH/DE ($n=71$) (%)	CH able-bodied ($n=71$) (%)
Gender			
Male	80	73	34
Female	20	27	66
Age			
<25	38	32	11
25–55	55	52	72
>55	7	16	17
Aetiology			
Accident	93	66	—
Illness	—	23	—
Suicide	—	1	—
Other	5	7	—
Unknown	2	3	—
Injury level			
Paraplegia	59	68	—
Tetraplegia	41	32	—
Completeness			
Complete	70	44	—
Incomplete	30	56	—

From a methodological point of view, there is no evidence in the literature that traumatic and nontraumatic have a differential psychological outcome.

Materials

PTD was evaluated using the Impact of Event Scale (IES),¹⁹ which measures the subjective impact of an individual's experience in terms of the degree of intrusion and avoidance. Intrusion is described as the unbidden recall into awareness of ideas, memories and emotions associated with the traumatic event, whereas avoidance involves conscious attempts to avoid reminders of the event through cognitive and behavioural efforts. The internal consistency of the IES-subscale intrusion, calculated using Cronbach's α , has been reported as $\alpha=0.78$ and IES-subscale avoidance $\alpha=0.82$. 'A correlation of 0.42 ($P>0.0002$) between the intrusion and avoidance subscale scores indicates that the two subsets are associated, but do not measure identical dimensions'.¹⁹

Coping repertoire was assessed with the COPE scale,¹⁶ and SOC in the CH/DE sample with Antonovsky's¹⁷ Sense of Coherence scale. 'The COPE has a constant set of scales and items and, for that reason, it currently enjoys wide use among coping researchers. The measure has good psychometric properties with α 's ranging from 0.45 to 0.92,..., and strong evidence of discriminant and convergent validity, with constructs

such as hardiness, optimism, control and self-esteem. At present, the COPE instrument is judged to be the most appropriate measure of coping strategies...'.²⁰ The average Cronbach α measure of internal consistency of 16 studies using the 13 item version of the SOC has been summarised by Antonovsky:²¹ The average reliability is 0.82 with a range from 0.74 to 0.91. The validity is adequately representative of the theoretical construct.²¹

Depression levels were measured using the Beck Depression Inventory (BDI)²² in the UK sample, and the Berne Questionnaire of Well-Being – Adult Form (BSW/A)²³ in the CH/DE sample. Although the BDI and BSWA assess the same construct, they cannot be compared directly as they measure depression and depressive mood, respectively, which differ in degree. Therefore, to establish a cutoff point on the BSWA which was comparable with the accepted BDI cutoff for this population (scores over 14),²⁴ 60 in-patients at one of the Swiss units (Nottwil), who were unconnected with the main study, completed both the BSWA and BDI. This revealed that 28.3% of the sample scored above 14 on the BDI, which implies that the comparable cutoff on the BSWA is for scores above 2.6, although it is acknowledged that this is not an official cutoff. A meta-analysis of the BDI's psychometric properties revealed satisfactory mean internal consistency coefficients α of 0.86 for psychiatric patients and 0.81 for nonpsychiatric populations, and satisfactory concurrent validity was demonstrated by comparisons of BDI scores with others measures of depression.²⁵ The internal consistency of the scale 'depressive mood' (BSW/A),²³ is $\alpha = 0.87$. To determine the relationship between the BDI and the BSW/A 'depressive mood', a Pearson correlation coefficient was calculated with the inpatient sample ($n = 60$) of the Swiss spinal unit in Nottwil. This analysis yielded a significant moderate positive correlation ($r = 0.631$, $P < 0.001$), accounting for 40% of the variance.

All the above measures have been successfully used in previous studies with this population.^{8,14,26,27}

Procedure

The data sets used in this study were part of longitudinal projects running in both the UK and Switzerland. In the UK, patients were invited to participate once they were medically stable (mean time since injury = 2.6 weeks, $SD = 0.798$), and were assisted in completing a questionnaire pack every 6 weeks throughout their rehabilitation. However, this study was only concerned with data gathered up to 6 months postinjury.

In the six Swiss and German centres, patients were also approached soon after injury, and completed questionnaire packs with the assistance of a psychologist if required, up to 6 months postinjury. All six centres returned the questionnaires to the primary author for collation and analysis.

During 5 months in 2001, 60 people with long-term SCI who re-entered the paraplegic centre of Nottwil, Switzerland, for re-rehabilitation were asked by a

psychologist to fill in both the BDI and the BSW/A soon after admission to measure their level of depression.

Questionnaire packs were also given to 306 able-bodied individuals living in Switzerland in order to estimate the level of PTD in this population. This phase of the data collection was conducted by students from the University of Bern. Out of these 306 able-bodied individuals, a sample of $n = 71$ was randomly selected to compare with the CH/DE sample ($n = 71$).

Results

For the data analyses that follow, statistical procedures of χ^2 , t -test for independent samples, multivariate analysis of variance (MANOVA), multiple regression analysis and analysis of variance (ANOVA) were performed. A significance level of $P < 0.05$ was considered as common for behavioural studies, but given the high number of analyses a more conservative level was used.

First Hypothesis 2: Initial analyses were performed to determine the level of caseness in the two samples with regard to PTD symptomatology, operationalised by symptoms of intrusion and symptoms of avoidance. Overall, it appears that a greater number of individuals with SCI in the UK scored above the clinical cutoff of 20 on the intrusion and avoidance subscales of the IES, although these differences were nonsignificant (15.3% (UK) vs 7.1% (CH/DE), $\chi^2 = 2.485$, $df = 1$, $P = 0.115$; 18.8% (UK) vs 8.6% (CH/DE), $\chi^2 = 3.313$, $df = 1$, $P = 0.069$; respectively). Furthermore, when the data was analysed along a continuum, there were also no significant differences between the 6 month postinjury UK and CH/DE samples on levels of intrusion or avoidance on the IES ($t_{(147.88)} = 1.362$, $P = 0.175$; $t_{(150)} = 0.449$, $P = 0.654$, respectively). Levene test showed no homogeneity of variance between the groups, the respective t -values were considered.

Between-subjects t -tests were performed to compare the CH/DE 6 month postinjury sample with the Swiss able-bodied sample on the IES. No significant differences were found (intrusion $t_{(125.22)} = -1.01$, $P = 0.31$ NS; avoidance $t = 0.66$, $P = 0.51$ NS). Levene test showed no homogeneity of variance between the groups, the respective t -values were considered (Table 2).

With regard to levels of depression/depressed mood, individuals were classed as having elevated depressive status if they had a score of greater than 14 or 2.6 on the

Table 2 Means and standard deviations (in parentheses) of the British (UK) and Swiss/German (CH/DE) samples

	6 months postinjury (UK)	6 months postinjury (CH/DE)	Able-bodied sample (CH/DE)
IES subscale			
Intrusion	10.53 (9.1)	9.31 (6.63)	10.65 (8.7)
Avoidance	10.88 (9.48)	10.37 (7.76)	9.4 (9.44)

BDI or BSW, respectively. In all, 32% of the UK sample scored above the cutoff, whereas this was only seen in 17% of the CH/DE sample. However, to reduce the incidence of type I error, which could have arisen due to the relatively small sample of 60 people with SCI determining the BSW cutoff, a significance level of $P < 0.01$ was indicated. The difference in caseness between the two samples may be regarded as not significant ($\chi^2 = 4.558$, $df = 1$, $P = 0.033$).

Hypothesis 1: Data from the SOC measure was only collected for the CH/DE 6 month postinjury sample ($n = 71$) and the Swiss able-bodied references ($n = 71$). A between-subjects t -test revealed that individuals with an SCI scored significantly higher on levels of SOC than did the Swiss able-bodied references ($t_{(140)} = 2.92$, $P < 0.05$).

A multivariate analysis of variance (MANOVA) was then performed on the data from the COPE measure in order to highlight any differences regarding coping repertoire that may exist between the two SCI samples (see Figure 2). It was found that the CH/DE sample at 6 months postinjury scored higher than UK individuals on positive reinterpretation and growth ($F(1, 140) = 7.281$, $P = 0.008$), use of active coping ($F(1, 140) = 16.351$, $P < 0.001$), suppression of competing activities ($F(1, 140) = 14.910$, $P < 0.001$) and restraint coping ($F(1, 140) = 18.910$, $P < 0.001$). However, the UK participants used humour as a coping strategy significantly more than the CH/DE sample ($F(1, 140) = 23.803$, $P < 0.001$).

The next set of analyses investigated to what degree one could predict PTD status on the basis of the coping strategies implemented. In order to maximise the sample size for the multiple regression analysis, the data from the CH/DE and UK samples at 6 months postinjury were combined. Sociodemographic variables could also play an important part in the PTD development. Therefore, it was first stepwise entered demographic variables (gender, age), then injury variables (level, completeness, time since injury), then culture (UK vs CH/DE coded as dummy variable) and last the coping strategies to predict IES intrusion and avoidance, respectively. Stepwise multiple regression analyses revealed that certain coping strategies significantly

predicted levels of intrusion and avoidance as indicated by IES scores (see Table 3). In relation to levels of *intrusion*, a significant model emerged accounting for 33% of the variance ($F_{(3, 126)} = 22.32$, $P < 0.001$, Adj. $R^2 = 0.331$), which entailed the coping strategies of 'focusing on and venting of emotions', and 'acceptance' which was negatively correlated with intrusion, the 'completeness of paralysis' did not add significantly to the variance accounted for if the accepted significance level is taken as $P = 0.01$. When *avoidance* was entered as the criterion variable, again a significant model was revealed ($F_{(5, 124)} = 21.83$, $P < 0.001$, Adj. $R^2 = 0.447$) accounting for 45% of the variance, which consisted of 'denial', 'suppression competing activities', 'planning', 'mental disengagement' and the sociodemographic variable 'culture'. However, the latter three elements did not add significantly to the variance accounted for if the accepted significance level is taken as $P = 0.01$.

Discussion

This study has revealed an absence of major discrepancies between two different cultures in regard to

Figure 2 Mean COPE scores with significant differences highlighted. *Significant differences $P < 0.05$

Table 3 Sociodemographic variables (gender, age), injury (level, completeness, time since injury), culture (UK, CH/DE) and coping strategies predicting concurrent intrusion as well as avoidance at 6 months postinjury

Criterion variable	Predictor variable	Adj. R^2 (cumulative)	β	t -value	p
Intrusion	Focus/venting emotions	0.26	0.41	5.34	<0.001
	Acceptance	0.31	-0.27	-3.42	0.001
	Completeness	0.33	-0.18	-2.41	0.017
Avoidance	Denial	0.35	0.53	7.33	<0.001
	Supp. competing activities	0.38	0.35	4.14	<0.001
	Planning	0.41	-0.25	-2.97	0.004
	Culture	0.43	-0.17	-2.45	0.016
	Mental disengagement	0.45	0.17	2.34	0.021

trauma-related distress following SCI, as no significant difference was noted between the UK and CH/DE samples on the Impact of Event Scale (IES) at up to 6 months postinjury. Furthermore, no significant difference was found between Swiss able-bodied and SCI individuals on the IES, indicating that the majority of SCI individuals are adapting well to their injury, which as the aforementioned model (Figure 1) predicts, may stem from the their concerted efforts to draw a sense of coherence from their predicament.

The three coping strategies focus/venting emotions, denial, supp. competing activities used by individuals were positively correlated ($P < 0.001$) with PTSD. Mental disengagement was still associated with a significance level of 5%. The two coping strategies Acceptance and Planning correlated highly ($P < 0.01$) negative with PTSD. These six coping strategies were accounting for 31% of the variance in intrusion scores and 43% of avoidance. Further 2% of the entire variance of intrusion were explained by SCI completeness ($P < 0.05$), and also further 2% of the entire variance of avoidance were explained by culture ($P < 0.05$; see Table 3). However, due to the cross-sectional nature of this study, it cannot be deemed that such strategies were causal factors in the development of PTSD, as they may simply be epiphenomena.²⁸

Although there were significant differences between the two samples on a number of coping strategies, previous research has not found these strategies under question to be predictive of depression, bar active coping.¹⁴ Therefore, the discrepancy between the two samples as regards depressive status needs to be further explored. It may be that individuals with an SCI in the UK tend to be more depressed at up to 6 months postinjury, or the disparity could have been due to the demographics of the sample used here, or the cutoff used for the BSW may not have been valid. Future research should administer the same instruments, especially when different cultures are involved, to avoid uncontrollable interferences.²⁹ The use of two different depression scales is a shortcoming of this study, even though both measures are positively ($P < 0.001$) correlated.

Further limitations of this study were the lack of able-bodied sample and SOC data for the UK, and the fact that all the participants in the UK sample had received their injury by 'traumatic' means.

Future research should further investigate what protects individuals from PTSD following SCI, such as the role of social support, exploring directly how the degree of SOC affects the coping strategies implemented, and evaluate the effectiveness of therapeutic interventions with this population.

The multidisciplinary team involved with each individual with SCI must make the creative process of mobilisation of coping resources understood, and hence encourage rewarding ways of coping. Trieschmann³⁰ described powerful reactions to the injury as a basis of hope and effective coping. Future research should explain explicitly the positive and the possible negative potential of such mobilised resources. A promising

practical approach to a more sensible psychological understanding now exists in the form of the Needs Assessment Checklist and Goal Planning Programme.^{31,32} This intervention combines the assessment of planned and achieved goals concerning functional status, social interaction skills and psychological well being, and hence clarifies the reciprocal relationship between daily rehabilitation efforts and quality of life.

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