

Regulation of emotion and psychological symptoms in people with spinal cord injury

Hans J. Znoj and Peter Lude

University of Bern, Department of Psychology, Switzerland

This cross-sectional study examined the contribution of regulation of emotion on depression, symptoms of traumatic and general distress, perceived disability, and somatic symptoms following spinal cord injury. Depressed and non-depressed participants ($N = 264$, mean age = 46 years) differed in their use of adaptive and maladaptive ways of regulating emotions. In addition to somatic symptoms and symptoms of traumatic stress, maladaptive emotional regulation (avoidance and distortion of awareness) accounted for 8% of the total variance of depression. It is concluded that adaptive and maladaptive ways of regulating emotions are important factors in dealing with negative feelings. Regulation of emotion appears to influence perceived disability mainly via depression. Limitations of the study and implications for rehabilitation are discussed.

Keywords: Spinal cord injury (SCI), regulation of emotion, depression, somatic symptoms

Regulation of emotions is important following stressful events in life (Horowitz, Znoj, & Stinson, 1996). The purpose of the present study was to explore the role of emotional regulation following a spinal cord injury (SCI). Regulation of emotion is directed at altering or preventing entry into negative emotional states (Lazarus & Launier, 1978). People may compare the outcome of their injuries with less favorable ones (Taylor, Wayment, & Collins, 1993), they may seek distraction and soothing activities (Rosenthal, 1993), or talk to close friends and other people they trust.

People use different strategies or techniques to come to terms with feeling of distress (Lazarus, 1991). Over the last few decades, research on psychological distress following SCI has increased. Much of this research has focused on depression and anxiety (e.g., Craig, Hancock, Dickson, Martin, & Chang, 1990; Elliot & Frank, 1996; Heinemann, 1995) but little has been reported about specific coping strategies or personality traits (e.g., Kennedy, Lowe, Grey, & Short, 1995; King & Kennedy, 1999; Krause & Rohe, 1998). Buckelew, Baumstark, Frank and

Hewitt (1990) found that greater distress in people with SCI was associated with increased wishful thinking, more emotional expressiveness, more self-blame and increased threat minimization.

Forceful control of feelings may impact upon cognitive functions such as memory and have long-term implications for psychological health. In this investigation, we differentiate between adaptive way of regulating emotions and maladaptive ways, such as active avoidance of emotional stimuli or cognitive processes to distort memory related to emotional events. In contrast to forceful attempts to control emotion and feelings, adaptive emotion regulation often occurs automatically and without explicit effort (Richards & Gross, 2000).

Similar to Kring and Bachorowsky (1999), we believe the emotional system is linked to various information processing components. Its link to the motivation component makes emotional regulation either adaptive or maladaptive, depending on approach or avoidance in the social context. We distinguished between adaptive and maladaptive outcomes of emotional regulation (Horowitz et al., 1996).

The EMOREG (Emotion Regulation Questionnaire) was developed to fill a gap between psychological consequences of traumatic experiences such as posttraumatic intrusions and avoidance of experience-related stimuli and general coping strategies. General coping strategies are aimed at regaining control over the environment by active coping or looking for help. Often, published formulations of the focus on emotion and emotion regulation are conflated with psychopathology (Stanton, Danoff-Burg, Cameron, & Ellis, 1994). Therefore, the EMOREG consists of one scale focusing on adaptive outcomes of a well functioning emotion regulation. Following suggestions in the literature, a scale of expression of emotion was included as well as two scales focusing on problematic forms of emotion regulation. Validity of the EMOREG has been demonstrated in two studies with bereaved persons and a control sample of the general population. The most important finding revealed that bereaved persons reported better ability in dealing with emotionally distressing situations following the experience of loss (Znoj & Grawe, 2000; Znoj & Keller, 2002).

Adaptive items reflect a working and often automatic regulation of emotion such as: "When experiencing emotionally overwhelming situations, often I am a person who can change the focus of my attention or stop dwelling on something when necessary". An item reflecting the expression of emotional states was: "When experiencing emotionally overwhelming situations, I often talk in depth about emotionally important topics". A maladaptive item, reflecting a high degree of avoidance was: "When experiencing emotionally overwhelming situations, often I am a person who moves and acts restlessly as a way of avoiding unpleasant thoughts and feelings". Concerning distortions of awareness, a maladaptive item was, "... I am a person who often mistakes or misunderstands what others mean". The rating-scale used in this study had a Likert-type format (from 1 [*very untrue of me*] to 6 [*very true of me*]). The adaptive scale used in this study is a composite of automatic adaptive emotion regulation and expression of emotion (coefficient $\alpha = .80$, and .60 respectively). The maladaptive emotional regulation scale is a composite of two subscales, avoidance and distortion (coefficient $\alpha = .66$, and .64 respectively). The coefficients alphas were .81 for adaptive emotional regulation, and .75 for maladaptive emotional regulation. Although the latter coefficient indicates less than desirable reliability, internal consistency can be regarded as sufficient for the present study.

Somatic Symptoms

Participants indicated on a scale from 0 (*not at all*) to 5 (*yes, very much*), whether they had experienced spinal cord

specific complications during the last four weeks. In addition, the following statements from the SCL-90R symptom check list (Derogatis, 1977) were included in the questionnaire: "pains in the lower back"; "soreness of your muscles"; "numbness or tingling in parts of your body"; "feeling weak in parts of your body"; "heavy feelings in your arms or legs". Together with the question for specific, SCI-related complications, these statements were used as a scale to indicate SCI-specific somatic symptoms. The internal consistency of this new scale was satisfactory (coefficient $\alpha = .84$).

Measures of psychological distress

The General Symptom Index (GSI) of the SCL-90R (Derogatis, 1977) was used as a global measure of distress.

The Impact of Event Scale (IES) (Horowitz, Wilner, & Alvarez, 1979) was used in its revised form (Maercker & Schuetzwohl, 1998; Weiss & Marmar, 1996). The IES is a self-report measure of subjective stress related to a specific stressful event. The instrument consists of three subscales: Intrusion, Avoidance, and Hyperarousal. The scales have been shown to be reliable and valid in a number of studies involving a variety of populations (Horowitz, Field, & Classen, 1993). In this study, we used the intrusion score of the IES (coefficient $\alpha = .87$).

To measure depression, we used the Beck Depression Inventory (BDI, Beck, 1978). We chose the BDI because of its clinical relevance and its frequent use in SCI research. As suggested by Elliott and Frank (1996), we used the BDI total score as an indicator for distress and not for diagnosis.

Analysis

We employed descriptive statistics and product moment correlations. In order to assess the effects of emotional regulation on depression and somatic symptoms, we conducted a MANOVA with depressed and non-depressed participants. We used hierarchical regression equations controlling for somatic symptoms of traumatic stress. In the two regression analyses, we used the dependent variable as predictor and vice versa. In this way we were able to calculate the exact share of variance that was contributed respectively by the two emotion regulation scales. However, given the interdependency of the data, we adjusted the *p*-values following Bonferroni's rule, correcting the error rates by the number of repeated tests. Hence, the observed significance level was adjusted for multiple comparisons. The scores on standardized instruments were not calculated when more than 15% of the items in the corresponding scales were missing. Therefore, the number of respondents varies in the different analyses.

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Results

Depression, somatic symptoms, and emotional regulation in SCI

We expected that adaptive and maladaptive ways of regulating emotions would contribute significantly to depression and somatic symptoms. The results revealed that the computed mean scores for general distress, depression, and stress symptoms had values similar to those that have been presented in the literature (e.g., Heinemann, 1995). There was no indication that the participants in this sample were biased in terms of social desirability. To test this assumption we included questions from the Marlowe-Crowne Social Desirability scale in the package of questionnaires; there was no significant relation to any of the scales considered here.

Compared with existing norms (Franke, 1995), 28% had high levels of symptoms, and 20% showed moderate levels of distress when using the General Symptom Index (GSI) from the SCL-90R. Following Bryant and Harvey (1996), it could be expected that up to 30% of the participants would suffer from trauma-related symptoms. When examining intrusions – the most indicative posttraumatic stress signs (IES-subscale) – the mean in our sample was 9.1 ($SD = 8.4$). This is approximately the same as the number given by Kennedy et al. (1995) for people with SCI, four to seven years post-injury. A score of nine in the IES-intrusion subscale represents an elevated level of trauma-related memories, feelings, and recurrent dreams but does not mean that people in our sample were generally traumatized. When using the DSM-criteria for posttraumatic stress disorder we found that approximately nine percent of the participants were traumatized at the time of investigation (Znoj, 2001). Table 2 lists the descriptive statistics for the variables of emotional regulation and psychological distress.

As indicated in Table 2, somatic symptoms, stress symptoms, and maladaptive emotional regulation were positively correlated with depression. Adaptive emotional regulation was negatively correlated with depression and general distress as measured with the GSI.

To examine the direct relationship of depression and regulation of emotion, we separated the non-depressed from the depressed using the BDI-sum cut-off at 14 (King & Kennedy, 1999). The results of the MANOVA indicated that depression was related to adaptive and maladaptive use of emotional regulation. Hotellings exact was $F(4, 259) = 10.63, p < .001$, and the univariate contrasts showed that adaptive regulations, $F = 5.29, p < .05$, avoidance as emotional regulation, $F = 24.82, p < .001$, and distortion of awareness, $F = 33.01, p < .001$ differentiated the non-depressed from the depressed participants.

We performed two regression analyses with depression and somatic symptoms as the dependent variables. To test the regression equations, we entered the independent variables stepwise as predictors in different hierarchical regression analyses. To control for degree of injury, completeness of paralysis was entered as the first block. Following the first block, symptoms were entered next, followed by the two composite scales (adaptive and maladaptive) of regulating emotion. Table 3 gives a more detailed summary of the findings.

Stress-related symptoms, SCI-related somatic symptoms, and maladaptive forms of emotional regulation (avoidance and cognitive distortion) proved to be important in predicting depression. Participants with incomplete paralysis had more somatic complaints than completely paralyzed participants, $F(1, 252) = 13.78, p < .01$. For depression, maladaptive emotion regulation added a further nine percent of explained variance, when degree of paralysis, somatic symptoms and intrusion as a posttraumatic stress symptom were entered first. Maladaptive emotion regulation was significantly related to depression follow-

Table 2
Zero-order correlations, means, standard deviations, and range of values of study variables

Measure	1	2	3	4	5	6
1. BDI-Depression	(.85)					
2. IES-Intrusion	.41**	(.87)				
3. SCL90R GSI	.61**	.39**	(.96)			
4. Somatic Symptoms	.48**	.31**	.75**	(.84)		
5. Adaptive Emotion Regulation	-.13*	-.07	-.18**	-.06	(.81)	
6. Maladaptive Emotion Regulation	.48**	.18**	.54**	.37**	-.22**	(.75)
<i>N</i>	264	254	263	264	264	264
<i>M</i>	9.42	9.07	.70	1.57	4.34	2.84
<i>SD</i>	7.38	8.42	.50	.98	.79	.88
Range	0-44	0-33	0-2.9	0-4	1.8-6	1-5.8

** $p < .01$, * $p < .05$, values in brackets are internal consistencies (coefficient α)

Table 3
Multiple regressions of emotion regulation on depression and somatic symptoms

Variable	df	R ²	ΔR ²	ΔF	β
<i>Depression</i>					
Step 1	1,242	.05		13.34	.05
Degree of SCI					
Step 2	1,241	.19	.14***	42.39	.28***
Stress Symptoms					
Step 3	1,240	.32	.12***	42.70	.26***
Somatic Symptoms					
Step 4					
Adaptive Regulation					-.04
Maladaptive Regulation	2,238	.41	.09***	18.45	.32***
<i>Somatic Symptoms</i>					
Step 1	1,242	.07**		18.03	.13*
Degree of SCI					
Step 2	1,241	.13	.06***	17.76	.11+
Stress Symptoms					
Step 3	1,240	.26	.13***	42.70	.31***
Depression					
Step 4					
Adaptive Regulation					.03
Maladaptive Regulation	2,238	.29	.03*	5.01	.20**

*** $p < .001$, ** $p < .01$, * $p < .05$; + $p < .10$.

ing Bonferroni's correction. The β -weight was .32, $p < .005$.

The total amount of explained variance for somatic symptoms was 29% compared to 41% for depression. In addition, entering the two emotion regulation scales added 3% to variance explained. Again, maladaptive emotion regulation was significantly related to somatic symptoms, the β -weight was .20, $p < .005$; following Bonferroni correction, the exact p -value was .004.

Discussion

The purpose of this study was to explore the role of emotional regulation in people with spinal cord injury (SCI). The statistical analysis confirmed our three hypotheses: 1. Non-depressed people with SCI displayed more adaptive and less maladaptive forms of emotion regulation; 2. Maladaptive forms of emotional regulation contributed significantly to depression; 3. Maladaptive forms of emotional regulation were positively associated with symptoms of traumatic stress and somatic symptoms.

We defined emotion regulation as a range of strategies dealing with emotional impact. In contrast to the definition of emotion-focused coping proposed by Lazarus and coworkers (e.g. Folkman & Lazarus, 1988) our emphasis was on the behavior and cognitive styles stabilizing the

self by minimizing discrepant perceptions. Such strategies help to reduce or transform the emotional response. For instance, avoiding persons or situations may stabilize emotional imbalance. The strategies serve as consistency safeguards and represent different cognitive styles and behaviors for coping with stressful encounters and life-events (Znoj & Grawe, 2000).

Non-depressed individuals used more adaptive emotional regulation, less avoidance and less distortion of awareness to regulate their emotions. Participants who used more maladaptive ways to manage the emotional meaning of the paralysis were significantly more depressed. Psychological symptoms such as depression or anxiety disorders can be regarded as both products and producers of emotional imbalance and dysregulation (Gross & Levenson, 1997; LeDoux, 1996).

Horowitz and Znoj (1999) have argued that emotional control processes affect an individual's awareness of a potentially stressful topic and his or her communication to others of thoughts, ideas and emotions related to that topic. In agreement with Leventhal and Scherer (1987) we view severe distress and excessive stress-related emotions partially as a failure of the emotion formation process.

In this study, maladaptive ways of regulating emotions, such as avoiding people or situations or using cognitive distortions, were rarely given high scores. When participants acknowledged using more maladaptive ways to regulate their emotions, they also experienced more psychological symptoms. According to Stanton and coworkers (1994), this could result from problematic formulations in the EMOREG. We do not share this view. Symptoms are sometimes the last consequences of dealing with conflicts (Grawe, 1998), problematic life-events, or chronic stressful encounters. In order to deal with such circumstances people often use cognitive strategies such as avoidance of people and places, irrational assumptions or blatant denial. The formulations of the EMOREG, especially of the two maladaptive scales, focus on such strategies. However, symptoms such as substance abuse (Geisler, Jousse, Wynne-Jones, & Breithaupt, 1983; Kurylo & Elliott, 1999) and even suicide (De Vivo, Black, Richards, & Stover, 1991; Kishi & Robinson, 1996) can be seen as unfavorable or tragic attempts to control feelings of distress following a SCI.

A life-long effort is required to regulate emotions when dealing with particularly stressful or painful circumstances. However, there are important individual differences in dealing with the emotional impact of a spinal cord injury. We learned from other investigations that a serious life-event such as a personal loss may positively influence the way emotions are handled (Znoj & Grawe, 2000; Znoj & Keller, 2002). Positive reinterpretation of the event and other strategies may become implicit with use and hence

be automatically applied to stressful emotional states. The more implicit and automatic an emotion regulation, the less cognitive effort is required. We know from research that emotional stress has a negative effect on cognitive processes (e.g. Braunstein-Bercovitz, Dimentman-Ashkenazi, & Lubow, 2001; Mathews & MacLeod, 1994). Therefore emotion regulation is important. At the same time, emotion regulation needs to be as effortless as possible. Too effortful an emotion regulation may have detrimental, and even paradox effects on mood (Wegner, Erber, & Zanakos, 1993).

Fourteen years after average post onset SCI, adaptive and maladaptive ways of regulating emotions contributed to the state of a person's well-being. We believe that better ways of regulating emotions could lead to fewer somatic complaints. Research has shown that training in coping activities can lead to improvement in the adaptation process in spinal cord injury (King & Kennedy, 1999). We therefore have good reason to test the causal assumptions underlying our hypotheses in a longitudinal study. The focus in future investigations will be on the consequences of adaptive forms of emotion regulation and whether training can improve such abilities.

One shortfall of the study was that the sampling procedure did not allow for the possibility of securing a higher response rate. Three out of four questionnaires distributed were not returned. This of course has consequences in terms of generalization. Comparisons of demographic data from those responding with the study on labor and social integration (Stirmann et al., 1998) conducted recently in Switzerland within the same population showed no specific demographic bias. However, we cannot exclude the possibility that the data reported here come from people whose condition was less serious, or indeed who suffered more. Another shortcoming is the cross-sectional design. In future investigations, a longitudinal study will be conducted. The results are nonetheless important both for theoretical and practical reasons.

Dealing with the emotional impact of a spinal cord injury is a prerequisite for dealing with other challenges that come with such an event. Therefore we need to understand the process of adaptation following a spinal cord injury in more detail and with more understanding of its determinants. This study is a first step in this direction.

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PD Dr. Hansjörg Znoj

Institut für Psychologie

Universität Bern

Muesmattstraße 45 – Unitobler

CH-3000 Bern 9

E-mail: hansjoerg.znoj@psy.unibe.ch

Appendix

Items and Scales of the EMotion REGulation Questionnaire (EMOREG)

The phrases below give a range of ways that people have used to describe how they handle *emotionally overwhelming* situations. Please endorse each item to whether it does or does not apply to your real behavior (not what you think is ideal). Circle the number of the response which best describes how much you think each statement is true of you much of the time (Scaling: very untrue of me = 1 to very true of me = 6).

I am a person who...

1. ... tries new ways of thinking and acting
2. ... avoids stressful thoughts or anticipation of threatening events
3. ... ends relationships in order to avoid feelings of humiliation
4. ... expresses my strong feelings clearly
5. ... weights carefully when a decision has to be made
6. ... talks in depth about emotionally important topics
7. ... overreacts emotionally
8. ... participates in a group at some times and takes care of personal needs at other times
9. ... has strengths and weaknesses and feels competent in most situations

10. ... can let go of a focus of attention or stop dwelling on something when necessary
 11. ... brings up very stressful topics when talking with a close friend
 12. ... gets fed up and leaves when angered
 13. ... uses distractions to avoid painful memories
 14. ... misperceives or misunderstands what others mean
 15. ... can relax but also can make an effort to achieve something
 16. ... has relationships that are usually equal and mutual
 17. ... jumbles talk about past, present, and future
 18. ... works hard but also gets enough rest
 19. ... moves and acts restlessly as a way of avoiding unpleasant thoughts and feelings
 20. ... monitors myself and/or others constantly
 21. ... feels misunderstood and therefore blames others
 22. ... avoids social tensions by keeping myself out of certain situations
 23. ... has trust in myself
 24. ... makes careful decisions about complex situations
- Adaptive Regulation of Emotion: 1, 5, 8, 9, 10, 15, 16, 18, 23, 24
 Expression: 4, 6, 11
 Avoidance (maladaptive): 2, 3, 12, 13, 19, 22
 Distortion (maladaptive): 7, 14, 17, 20, 21