Eur. J. Psychiat. 2018;32(1):36–43

THE EUROPEAN JOURNAL OF PSYCHIATRY

www.elsevier.es/ejpsy

ORIGINAL ARTICLE

Duration of disability, functional independence, coping styles and the quality of life in patients with spinal cord injury – Pilot study

K. Nowakowska-Domagała[a,*], **T. Pietras**[b], **K. Jabłkowska-Górecka**[c], **P. Stecz**[a]

[a] *Department of Preventive and Addiction Psychology, Institute of Psychology, Faculty of Educational Sciences, University of Lodz, Smugowa 10/12, 91-433 Lodz, Poland*
[b] *Department of Clinical Pharmacology, Medical University of Lodz, Kopcinskiego 22, Lodz 91-153, Poland*
[c] *Public Health Division, Faculty of Health Sciences, Medical University of Warsaw, Banacha 1A, Bldg. F, 02-097 Warsaw, Poland*

Received 11 May 2017; accepted 20 September 2017
Available online 9 November 2017

KEYWORDS
Stress coping styles;
Problem-focused coping;
Emotion-focused coping;
Psychological quality of life;
SCI

Abstract
Background and objectives: Spinal cord injuries are associated with permanent disability, long-term rehabilitation and psychological readaptation to situational change. The aim of the study was to assess the performance of basic activities, quality of life and stress coping style of patients with spinal cord injuries, and to identify a predictive correlation between the duration of the injury, coping styles or functional assessment and the psychological domain of QOL.
Methods: Thirty-five patients were studied by self-reporting and observational methods using questionnaires, CISS, SCIM-II, WHOQoL-Bref scales and a patient survey.
Results: The predictors of the psychological domain of life quality include an emotion-oriented coping style (negative, $\beta = -.36$, $p < .05$) and functionality with respect to self-care (positive, $\beta = .57$, $p < .01$) with a moderate level of model fitting ($R^2 = .42$). Although the time of living with the disease was not found to be a significant predictor of psychological quality of life, a weak curvilinear relationship was identified between the two ($R^2 = .25$).
Conclusions: The results suggest that the psychological aspects of QOL observed after SCI may be associated with an emotional coping style. Hence, there is a need for deeper analysis of the role played by emotions and perception associated with chronic stress in patients with SCI.

* Corresponding author.
E-mail address: katarzyna.nowakowskadomagala@uni.lodz.pl (K. Nowakowska-Domagała).

https://doi.org/10.1016/j.ejpsy.2017.09.004

Introduction

Approximately 250,000 to 500,000 new spinal cord injury (SCI) cases are registered in the world every year. People with SCI are two- to five-times more likely to die prematurely, with worse survival rates in low- and middle-income countries. Studies report that roughly twice as many male as female adults experience SCI.[1,2] Spinal cord injury contributes to the impaired function of many organs, including the muscular, respiratory, endocrine and cardiovascular systems, as well as the gastrointestinal and urinary tracts, and processes such as the water-electrolyte balance, protein turnover and metabolism.[3–8] In addition, a recent review has estimated that 20–30% of people with SCI show clinically significant symptoms of depression.[9] Depression is associated with fewer improvements in functioning, increased health complications such as pressure ulcers and urinary tract infections, high rates of suicide, increased rates of hospitalization and higher medical expenses.[10,11]

SCI places a great strain on the financial situation of the patient and can represent a considerable burden on the family. It also affects pain interference and considerably impairs the ability of the patient to cope with everyday activities.[12–15]

As the disability caused by SCI may be permanent, it may constitute a serious psychological burden. Early research suggested that the risks of psychopathology were minimal, preferring to label any psychological disturbance as 'despondency', that is, a dysphoric or unhappy reaction to the injury, representing only part of a single stage in the process of adjustment to injury.[16,17] However, more recent research indicates that a greater risk of psychological morbidity is associated with SCI than with a 'normal process' of grieving and sadness resulting from the significant losses associated with the injury.[18,19]

Biopsychosocial factors seem to better describe the functioning, disability and overall health of individuals with SCI than biomedical factors. Health conditions such as SCI are known to affect the participation and psychological state of the individual, which indirectly influence mental and physical health.[20] Social Science studies, particularly those assuming the biopsychosocial model of health and disease, emphasize the importance of social beliefs and attitudes toward disability contributing to structural inequality and systemic barriers (i.e. policies).[20,21] This model also considers the effects of individual factors, such as psychological stress and coping style, on different areas of functioning, both in healthy subjects and in patients.[22]

The agents consistently associated with life satisfaction or mental health following SCI include perceived control in life, sense of coherence, positive factors such as hope and purpose in life, feelings of self-worth such as self-efficacy and self-esteem, positive and negative affect, and post-traumatic cognition.[23]

Coping with stress is thought to be an important, potentially positive and person-related factor in predicting the overall functioning of an individual with chronic illness. Although problem-focused coping (i.e. planning, confronting) is generally considered to be a favorable style, this has yet to be confirmed. It is possible that where goals set before injury are blocked, as is the case with SCI, adjusting personal preferences and goals to the situational change is more effective than vice versa: actively trying to adjust life circumstances to personal preferences.[24] Emotion-focused coping, involving the reduction of negative feelings associated with the stressful event, may be defined as a style when the individual tends to cope with stress by focusing on strategies including self-blame, negative thinking, worrying or acceptance. Despite their universal use in the SCI population, they are believed to be less effective than problem-oriented strategies; however, their effectiveness depends on patient circumstances, such as the controllability of stressors.[25]

Interventions that address the coping strategies of patients with SCI may reduce several aspects of negative emotional functioning, including depression and anxiety disorders.[24] It may be the case that effective coping could also predict higher overall quality of life (QOL) and life satisfaction. This hypothesis is grounded in a positive approach, and somewhat contradicts the findings of several clinically-oriented studies that examine the relationship of coping and affective disorders, stress-related disorders, mortality or physical function following SCI.[26–28]

The rehabilitation of the patient is of key importance in therapy; however, although the continuation and duration of therapy may have positive effects on function, performance does not generally return to the baseline level following treatment,[29] and functional deficiency is usually permanent. Although the primary aim of rehabilitation is to improve patient function and reduce impairment, it may also indirectly affect psychosocial functioning.[30] To improve the living conditions and general health of the patient, and maintain well-being, it is also necessary to determine the factors which might affect the QOL from the point of view of mental health, particularly the psychological domain of QOL (i.e. body image and appearance, negative feelings, positive feelings, self-esteem, spirituality/religion/personal beliefs).

Therefore, this study examines the multidimensional nature of the psychological aspect of the QOL of patients with SCI, particularly its variability and predictability, and assesses potential corrective measures.

There are numerous conceptualizations of the notion of QOL; however, the World Health Organization defines it as the ''individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns''.[31] Defined in this way, it incorporates health condition, cognitive processes, emotions and behaviors. An alternative approach to characterizing general QOL is based on the conceptual model developed by Wilson and Cleary.[32] It presumes that personality traits may influence both the subject's functioning and the general QOL, with the latter dependent also on the level of functioning, which itself is associated with disease symptoms, biological and physiological factors. Another assumption of the model is the environment may also influence functioning and general QOL. As far as patients with SCI are concerned, the Wilson and Cleary model, broadly understood, can be used to verify the effect of environmental variables (rehabilitation time) individual differences (coping styles), and symptoms and functioning (assessment of functional independence), to determine the psychological dimensions of QOL. Hill et al.[33] recommend the WHOQOL-BREF, a four-domain scale,[34] as

the most acceptable and established instrument for measuring Quality of life (QOL) after SCI because it combines the features of both objective and subjective QOL.

The QOL of persons who sustain a spinal SCI seems to be lower than that of the general population.[35,36] Interestingly, it appears not to be directly related to the severity of SCI,[36,37] but more to the perceived health of the patients, their participation and integration, social support and relationships, as well as to such living circumstances as accessibility or income.[35,37]

Previous qualitative studies of the QOL of SCI patients have generally evaluated experiencing loss, somatic symptoms and disorders, problems with interpersonal relationships, involuntary termination of employment, cognitive reframing of the situation and the sense of self-continuity.[37,38] The aim of the present study is to assess the extent to which the psychological domain of QOL of the SCI patient can be predicted based on an assessment of functional independence after SCI, duration of injury and coping style.

Materials and methods

The respondents were selected from the patients of public inpatient and outpatient rehabilitation centers located in the Mazovia region. The respondents received the questionnaires during rehabilitation therapy control visits. Two institutions were situated in rural areas, another two in urban areas and another two in the metropolitan area of Warsaw. The exclusion criteria were as follows: the presence of a diagnosis of another serious somatic condition (e.g. diabetes), mental disorders, intellectual disability, or concurrent neurological disorders (e.g. Parkinson's disease). The study was approved by the Bioethics Committee of the Medical University of Lodz. In total, 36 of the 50 available patients agreed to take part in the study, making a response rate of 72%. Formal consent was obtained from all participants. One participant was excluded from analyses due to missing data. The final 35 patients included in the analyses (mean age 32.94 ± 7.48 age range h = 32) had SCIs located in the following segments of the spine: cervical (43%), upper thoracic (20%), lower thoracic (17%) and the lumbar (20%), all resulting in considerable impairment of mobility and function.

Women accounted for 34.3% of the study group, which reflects the proportion of female patients in the general population with SCI. The mean time expressed in years elapsed from the moment of the injury was 8.63 ($\pm$4.07). Subjects receiving disability benefits accounted for approximately half of the study group (48.6%) and a third (34.3%) were in employment. The remaining subjects were in education (14.3%), or unemployed (2.8%).

The study was conducted with the use of the SCIM-II (Spinal Cord Independence Measure), the Coping Inventory for Stressful Situations (CISS) and the WHOQoL-BREF (WHO Quality of Life – abbreviated version). Other demographic and other injury-related data was also collected.

The SCIM-II (Spinal Cord Independence Measure) was developed by Catz and Itzkovitch.[39] It is a relatively new tool for the functional assessment (e.g. self-management, mobility) of patients following SCI which can be used in rehabilitation to determine the extent of disability and assess the ability to perform everyday activities (ADL). The tool examines functioning and activity in four areas (self-care, respiration, management of sphincters, indoor and outdoor mobility) via 18 test items, assessed according to a scoring system with a total score for the four areas ranging from 0 to 100. Most of the tasks are assessed by a supervising physiotherapist, while some items (e.g. bladder control) can be assessed by self-reporting. Catz et al. reported that SCIM-II tool has good validity and interrater reliability.[39]

The Coping Inventory for Stressful Situations Questionnaire (CISS) developed by Endler and Parker[40] and adapted by Strelau et al.[41] was used for the diagnosis of coping styles. It consists of 48 statements describing the individual's behavior in a stressful situation. The questionnaire uses a five-grade scale to measure the frequency of three basic coping styles: task-oriented, emotion-oriented and avoidance-oriented coping. The latter style can be further interpreted using two subscales – social diversion and distraction. According to Strelau et al.,[41] the minimum score that can be obtained within each scale is 16 and the maximum one 80. The alpha Cronbach's internal consistency coefficients of .84 to .91 have been estimated and reported by Endler & Parker.[40]

In addition, the study includes the WHOQoL-BREF (WHO Quality of Life – abbreviated version), which was developed by the WHO from the WHOWoL-100 version, designed for a population of healthy and sick subjects. The version used consists of 26 items examining the psychological, somatic, social and environmental domains of QOL. Raw results obtained in individual domains are converted to give final scores falling within the 0–100 range.[42] The WHOQOL-BREF is presently the most acceptable and well-established instrument for assessing QOL after SCI as it addresses both objective and subjective QOL, is based upon an international effort to clearly define QOL, and has been well studied in SCI populations with acceptable results.[33]

In addition, a patient survey addressing patient sex, age, duration of injury, location of the injury and employment/occupation was also developed by the authors.

Statistical analyses

The collected data was first tested for normality using the Shapiro–Wilk test. Pearson correlation analyses were performed to measure the associations between the coping styles, the independence measurement and the psychological domain of QOL.

The next step was to determine the relationship between the time of injury and the psychological domain of QOL using a regression curve. Finally, a multiple hierarchical regression model was constructed including the variables believed to be most closely related to the psychological domain of QOL. The assumptions for performing multiple regression were not violated (normal distribution, collinearity, homoscedasticity). The analyses were conducted using the SPSS 17.1 package. The significance level used in hypothesis testing was .05.

Results

Regarding functional independence, the patients displayed the best coping skills in the self-care domain, and relatively the worst for outdoor mobility. The mean scores within the different life domains were typically around 70 points (Table 1). Table 2 presents the results of the Pearson's correlation analysis of the relationships between coping styles, functional assessment of independence, duration of the injury and the psychological domain of QOL. The significant correlates in this area include the emotion-oriented coping style, duration of the injury, as well as in all dimensions and total SCIM score.

A scatter plot of QOL against duration of the injury suggested the presence of a curvilinear relationship between the two variables. Therefore, a curve estimation was performed, and the degree of fit of the linear curve model was compared with the S-curve model. Despite the existence of a positive correlation between the duration of injury and the psychological domain scores of QOL, no linear function accounting for the variance of the psychological domain could be established [$R^2 = .09$; $F(1,33) = 3.395$, $p = .07$]. It was also not possible to fit the model against the S-curve (Fig. 1) due to its low determination coefficient value, although the relationship was statistically significant [$R^2 = .25$; $F(1, 33) = 10.734$; $p = .002$; standardized $\beta = -.50$, $t = -3.276$; Con = 58.20].

Table 3 presents the results of a hierarchical regression analysis where the explained variable was the psychological domain of QOL, and the explanatory variables included the situational (duration of SCI), psychological (emotion-focused coping style) and biological (assessment of functional independence) correlates. Only statistically significant and highly correlated covariates from each domain (psychological, biological, situational) were included in the multivariate model. The hierarchical regression model was applied to test the predictive value of the factors from the abovementioned domains on variability of psychological QoL. At the first stage, the duration of disability entered the regression equation but the outcome was not significant. In the next step, the self care functionality entered the equation and the duration of injury was not removed as it approached the significance level. In the third block, the aim was to assess the magnitude of R square change when adding the psychological variable (emotion-oriented coping style) to the equation. Finally, another hierarchical model (number 4) was constructed based on the previous models with a significance of F of $\leq .05$ for entry level and $\geq .10$ for removal level. The model had two statistically significant predictors and provided a satisfactory fit to the data [$F(2, 32) = 11.637$, $p < .0005$; $R^2 = .42$]. This model indicated a negative correlation between emotion-focused coping and the psychological domain of QOL. The intercorrelations between the independent variables included in the regression model varied from 0.05 to 0.49. The variance inflation factor value was 1.05 and the highest condition index value in the final regression model was 11.46, which suggests there was no severe multicollinearity problem. Breusch-Pagan and Koenker tests indicate that the assumption of homoscedasticity was not violated (BP Lengrange multiplier LM = .800, $p = .849$, Koenker LM = 1.239, $p = .741$).

Discussion

As previously noted by Van Delft-Schreurs et al.,[43] our findings suggest that in addition to variables such as degree of injury and severity of dysfunction, psychosocial factors significantly affect the QOL of SCI patients. However, according to Chevalier et al.,[44] the adjustment trajectories of patients with SCI demonstrate high variability, which makes it difficult to develop a uniform formulation for the readjustment factors. The overall result confirms that psychological QOL in the studied group is also strongly associated with functional independence.[44]

The results of this study may suggest that interventions directed to emotion-focused coping strategies may improve QOL. The high prevalence of depression and anxiety disorder in the SCI population may be related to strong negative emotional reactions and specific cognitive appraisal of stressful life events in terms of threat and loss but not challenge.[45,46] Therefore, the SCI population seems to be highly indicated for counter-conditioning, which may decrease or eliminate the potentially maladaptive emotional reactions or replace them with more functional coping resources. Emotional coping may involve both dysfunctional reactions, such as substance abuse, and positive ones, such as seeking support.

Previous studies have reported no significant relationship between coping strategies and emotional well-being if controlled for disability-related variables.[47] However, these studies are based on coping strategies instead of coping styles and emotional well-being, which is not entirely equal to the psychological domain of QOL. Our analysis of coping styles may offer a broader perspective than previous investigations of coping strategies, which are limited to specific situations and may change over time.

In the current literature, styles of coping stress are viewed in connection with dispositions of individuals, and their characteristic ways or strategies of coping with stress,[40,48] such defined styles of coping with stress are determined by temperament.[49] Although the methodology our this study does not directly imply the role of emotional coping style, since the design was cross-sectional our speculation on the causality is based on the individual differences of coping styles, which are biologically determined features and thus may be primary to perceived quality of life.

A larger longitudinal study would allow a clearer understanding of the association between coping and QOL. Kennedy et al.,[26] reported that coping strategies predicted adjustment after one year follow up ($n = 87$), the results did not show any long-term perspective and were focused on coping strategies rather than coping style.

As confirmed by Van Leeuwen et al.,[50] the relationship between the duration of the injury and the QOL is not necessarily curvilinear. They observed that during the first five years after the injury, most life satisfaction trajectories remain at a similar level, with around 25% of patients demonstrating a significant increase and a 2% decrease. This may be attributed to the fact that the population of SCI patients is a heterogeneous group, and the prognoses are dependent on many variables. The effects of rehabilitation during the initial period following the injury can be additionally reinforced with a psychological approach. A prospective study conducted in selected English-speaking

Table 1 Characteristics of the study group with respect to the analyzed variables.

Measurement tool	Variable	*M*	σ	Difference F–M[a]		
				p	*U*[a]	*t*[a]
CISS (raw score results)	Age	32.94	7.48	.943		−.072
	Time elapsed from the moment of injury in years	8.63	4.07	.128		1.561
	Task Oriented Coping Style	57.40	9.16	.081		−1.797
	Emotion Oriented Coping Style	41.03	9.62	.904		−.122
	Avoidance Oriented Coping Style	43.74	11.34	.578		.568
SCIM (raw score results)	Self-care	16.69	5.06	.739	129.00	
	Sphincter management and respiration	33.11	8.26	.343	111.00	
	Indoor mobility	7.86	3.01	.541	121.50	
	Outdoor mobility	8.91	3.51	1.000	138.00	
	General functional independence	66.57	18.06	.702	127.00	
WHOQoL-Bref (calculated results)	Somatic domain	70.03	16.19	.619	123.50	
	Psychological domain	66.57	16.16	.684		−.410
	Social domain	68.34	18.40	.542		−.616
	Environmental domain	66.09	13.10	.769		−.296

[a] In the case of normal distributions, (F-M) the Female–Male differences were tested with Student-*t* test, and if there was no assumption of distribution normality – with Mann–Whitney test.

Table 2 Pearson correlations of the analyzed variables with quality of life ratings in the psychological aspect.

	WHOQoL-BREF Psychological Domain		
		r	*p*
CISS	Task Oriented Coping Style	−.08	.327
	Emotion Oriented Coping Style	−.32	.033
	Avoidance Oriented Coping Style	.10	.294
SCIM	Self-care	.54	<.0005
	Respiration and sphincter management	.48	.002
	Indoor mobility	.53	.001
	Outdoor mobility	.32	.030
	Overall result	.52	.001
	Time elapsed from the moment of injury[a]	.31	.037

Legends:
CISS – Coping Inventory for Stressful Situations.
SCIM – Spinal Cord Independence Measure.
[a] One-tailed test.

countries demonstrated that an assessment of the thinking processes associated with cognitive appraisal, the event and the coping styles performed in the sixth week after the injury allowed the degree of mental well-being after three months to be predicted.[50] The process of psychological readaptation may play an important role in the progress of rehabilitation and improvement of mental well-being during the initial period following the injury and the next couple of years, as indicated by the shape of the curve obtained in this study. Previous studies suggest that some SCI patients may display difficulties when achieving long-term goals in such areas as gaining employment and engaging in leisure and community activities, which could be attributed to poorer mood levels.[44]

The study does have some limitations which should be considered when formulating any generalizations with respect to the population of SCI patients. As the population sample is quite small, the conclusions drawn in this study are limited to the analyzed respondents. The locations of SCI varied in the studied group. As the sizes of the particular subgroups were small, it was not possible to evaluate the effect of injury location on the investigated variables, which may present a certain limitation to the study; however, the key aim was to differentiate functional level, assessed according to the SCIM-II (Spinal Cord Independence Measure) scale.

The results can be regarded as pilot findings, providing a rationale for the design of further analyses of coping styles while controlling the functional and situational mediator variables. Relatively good model fit puts our results possibly important for QoL in SCI considering biopsychosocial model of the disease. Our findings could help develop interventions for establishing new attitudes, or bolstering existing ones, that facilitate positive outcomes after the onset of disability.

We believe that future research concerning the functioning of SCI patients should include the involvement of a multidisciplinary research team including a physiothera-

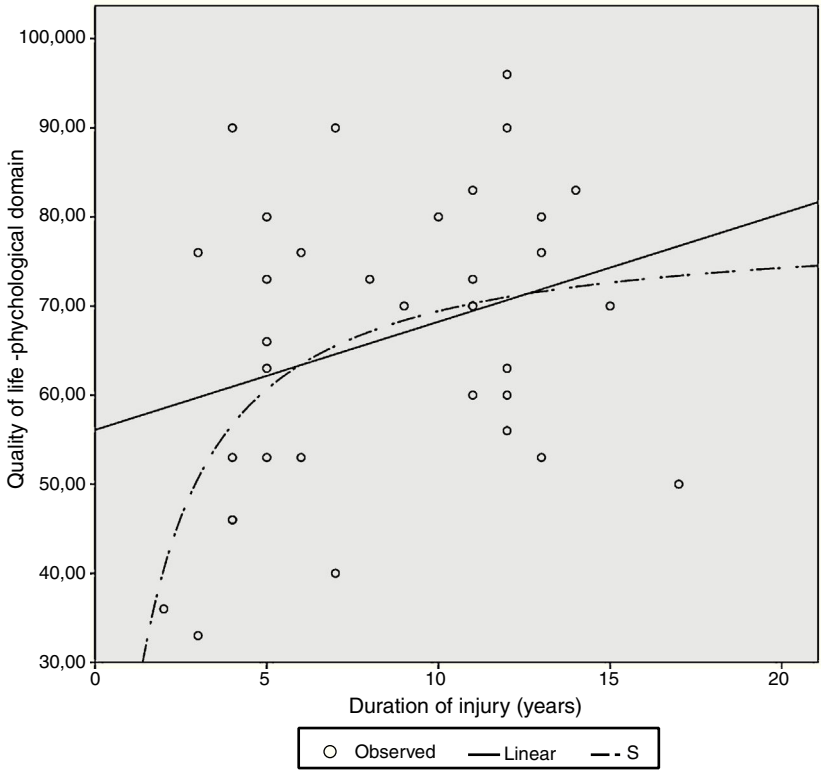

Figure 1 Estimation of the linear curve and the ''S'' curve for the correlation between the duration of spinal cord injury and the psychological domain of QOL.

Table 3 Predictors of life quality in the psychological aspects in patients with spinal cord injury – hierarchical regression.

Model	Predictors				Non standardized coefficients		Standardized coefficients		
		R	R^2	*R* sq change	*B*	SE	β	*t*	*p*
1[a]	Dur of Dis	.31	.09	.09	1.21	.66	.30	1.843	.074
2[b]	Dur of Dis	.55	.30	.20	.19	.68	.05	.281	.780
	Self-care				1.66	.55	.52	3.044	.005
3[c]	Dur of Dis	.65	.42	.13	.23	.62	.06	.361	.721
	Self-care				1.73	.50	.54	3.441	.002
	EOS				−.60	.23	−.36	−2.610	.014
4[d,e]	Self-care	.65.	.42	.13	1.817	.43	.57	4.220	<.0005
	EOS				−.60	.23	−.36	−2.639	.013

[a] ANOVA $F(1, 33) = 3.395$, $p = .074$.
[b] ANOVA $F(2, 32) = 6.754$, $p = .004$, $F_{change}(1,32) = 9.263$, $p = .005$.
[c] ANOVA $F(3, 31) = 7.591$, $p < .001$, $F_{change}(1,31) = 6.811$, $p = .014$.
[d] ANOVA $F(2, 32) = 11.637$, $p < .0005$, $F_{change}(1,32) = 6.963$, $p = .013$.
[e] excluded variable: duration of disability, Dur of Dis – duration of disability, Self-care – self-care functionality, EOS – emotion-oriented coping style, β – standardized beta.

pist trained to administer the disability scale, as well as psychologists and physicians.

Conclusions

1. The results suggest that the psychological aspects of QOL in SCI patients may be associated with an emotional coping style.
2. The emotion-focused coping style and self-care independence (among others) predict the psychological domain of QOL.
3. The relationship between duration of injury and QOL following SCI in the studied patients is not linear.
4. The results provide a basis for future prospective studies of the role played by the emotion-focused coping style in the psychological functioning of patients with SCI.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of interest

All authors wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

Acknowledgments

The authors would like to sincerely thank those people who helped in this project.

References

1. Whoqol Group. The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. Soc Sci Med. 1995;41:1403–9.
2. WHO. International Perspectives on Spinal Cord Injury; 2013.
3. Krassioukov A, Eng JJ, Warburton DE, Teasell R. A systematic review of the management of orthostatic hypotension after spinal cord injury. Arch Phys Med Rehabil. 2009;90:876–85.
4. Cardozo CP. Respiratory complications of spinal cord injury. J Spinal Cord Med. 2007;30:307–8.
5. Teasell RW, Hsieh JT, Aubut JA, Eng JJ, Krassioukov A, Tu L, Spinal Cord Injury Rehabilitation Evidence Review Research Team. Venous thromboembolism after spinal cord injury. Arch Phys Med Rehabil. 2009;90(2):232–45, http://dx.doi.org/10.1016/j.apmr.2008.09.557. Review.
6. Engkasan JP, Ng CJ, Low WY. Factors influencing bladder management in male patients with spinal cord injury: a qualitative study. Spinal Cord. 2014;52:157–62.
7. Haisma JA, van der Woude LH, Stam HJ, Bergen MP, Sluis TA, Post MW, et al. Complications following spinal cord injury: occurrence and risk factors in a longitudinal study during and after inpatient rehabilitation. J Rehabil Med. 2007;39(5):393–8.
8. Bryce T. Spinal Cord Injury. Demos Medical; 2010.
9. Post MW, van Leeuwen CM. Psychosocial issues in spinal cord injury: a review. Spinal Cord. 2012;50:382–9.
10. Fann JR, Bombardier CH, Richards JS, Tate DG, Wilson CS, Temkin N, PRISMS Investigators. Depression after spinal cord injury: comorbidities, mental health service use, and adequacy of treatment. Arch Phys Med Rehabil. 2011;92(3):352–60, http://dx.doi.org/10.1016/j.apmr.2010.05.016.
11. Kennedy P, Evans M, Sandhu N. Psychological adjustment to spinal cord injury: the contirubion of coping, hope, and cognitive appraisals. Psychol Heal Med. 2009;14:17–33.
12. Saunders LL, Krause JS, Acuna J. Association of race, socioeconomic status, and health care access with pressure ulcers after spinal cord injury. Arch Phys Med Rehabil. 2012;93:972–7.
13. Müller R, Peter C, Cieza A, Geyh S. The role of social support and social skills in people with spinal cord injury—a systematic review of the literature. Spinal Cord. 2012;50:94–106.
14. Botticello AL, Chen Y, Cao Y, Tulsky DS. Do communities matter after rehabilitation? the effect of socioeconomic and urban stratification on well-being after spinal cord injury. Arch Phys Med Rehabil. 2011;92:464–71.
15. Lohne V, Severinsson E. Patients' experiences of hope and suffering during the first year following acute spinal cord injury. J Clin Nurs. 2005;14:285–93.
16. Buckelew SP, Frank RG, Elliott TR, Chaney J, Hewett J. Adjustment to spinal cord injury: stage theory revisited. Paraplegia. 1991;29:125–30.
17. Elliott TR, Kennedy P. Treatment of depression following spinal cord injury: an evidence-based review. Rehabil Psychol. 2004;49:134–9.
18. Craig A, Tran Y, Middleton J. Psychological morbidity and spinal cord injury: a systematic review. Spinal Cord. 2009;47:108–14.
19. Craig, a R, Hancock K, Dickson H, Chang E. Long-term psychological outcomes in spinal cord injured persons: results of a controlled trial using cognitive behavior therapy. Arch Phys Med Rehabil. 1997;78:33–8.
20. Geyh S, Nick E, Stirnimann D, Ehrat S, Müller R, Michel F. Biopsychosocial outcomes in individuals with and without spinal cord injury: a Swiss comparative study. Spinal Cord. 2012;50(8):614–22, http://dx.doi.org/10.1038/sc.2012.21.
21. Goering S. Rethinking disability: the social model of disability and chronic disease. Curr Rev Musculoskelet Med. 2015:134–8, http://dx.doi.org/10.1007/s12178-015-9273-z.
22. Kennedy P, Lude P, Elfstroem ML, Smithson EF. Psychological contributions to functional independence: a longitudinal investigation of spinal cord injury rehabilitation. Arch Phys Med Rehabil. 2011;92:597–602.
23. van Leeuwen CM, Kraaijeveld S, Lindeman E, Post MW. Associations between psychological factors and quality of life ratings in persons with spinal cord injury: a systematic review. Spinal Cord. 2012;50:174–87.
24. Van Lankveld W, Van Diemen T, Van Nes I. Coping with spinal cord injury: tenacious goal pursuit and flexible goal adjustment. J Rehabil Med. 2011;43:923–9.
25. DeGraff AH, Schaffer J. Emotion-focused coping: a primary defense against stress for people living with spinal cord injury. J Rehab. 2008;74:19.
26. Kennedy P, Marsh N, Lowe R, Grey N, Short E, Rogers B. A longitudinal analysis of psychological impact and coping strategies following spinal cord injury. Br J Health Psychol. 2000;5:157–72.
27. Kennedy P, Duff J, Evans M, Beedie A. Coping effectiveness training reduces depression and anxiety following traumatic spinal cord injuries. Br J Clin Psychol. 2003;42 42(Pt 1):41–52.
28. Schönenberg M, Reimitz M, Jusyte A, Maier D, Badke A, Hautzinger M. Depression, posttraumatic stress, and risk factors following spinal cord injury. Int J Behv Med. 2014;21(1):169–76.
29. Onifer SM, Smith GM, Fouad K. Plasticity after spinal cord injury: relevance to recovery and approaches to facilitate it. Neurotherapeutics. 2011;8:283–93.
30. Kooijmans H, Post MW, van der Woude LH, de Groot S, Stam HJ, Bussmann JB. Randomized controlled trial of a self-management intervention in persons with spinal cord injury: design of the HABITS (Healthy Active Behavioural IntervenTion in SCI) study. Disabil Rehabil. 2013;35(13):1111–8, http://dx.doi.org/10.3109/09638288.2012.718406.
31. Group W. Development of the WHOQOL: Rationale and Current Status. Int J Ment Health. 1994;23:24–56.
32. Wilson I, Cleary P. Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. JAMA. 1995;273:59–65.
33. Hill M, Noonan V, Sakakibara B, Miller W. Quality of life instruments and definitions in individuals with spinal cord injury: A systematic review. Spinal Cord. 2010;48:438–50.
34. THE WHOQOL GROUP. Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. Psychol Med. 1998;28:551–8.
35. Dijkers MPJM. Quality of life of individuals with spinal cord injury: a review of conceptualization, measurement, and research findings. J Rehabil Res Dev. 2005;42(3 Supp):87–110.
36. Post M, Noreau L. Quality of life after spinal cord injury. J Neurol Phys Ther. 2005;29:139–46.
37. Hammell KW. Quality of life after spinal cord injury: a meta-synthesis of qualitative findings. Spinal Cord. 2007;45:124–39.
38. Boakye M, Leigh BC, Skelly AC. Quality of life in persons with spinal cord injury: comparisons with other populations. J Neurosurg Spine. 2012;17:29–37.

39. Catz A, Itzkovich M, Steinberg F, Philo O, Ring H, Ronen J, et al. The Catz-Itzkovich SCIM: a revised version of the Spinal Cord Independence Measure. Disabil Rehabil. 2001;23(6):263–8.
40. Endler NS, Parker JD. Multidimensional assessment of coping: a critical evaluation. J Pers Soc Psychol. 1990;58:844–54.
41. Strelau J, Jaworowska A, Wrześniewski K, S.P. Coping in Stress Situations (CISS) Questionnaire. Psychological Test Laboratory; 2005.
42. Wołowicka L, Jaracz K. Polish version of WHOQoL-100 and WHOQoL-BREF. In: Wołowicka L, editor. Quality of life in medical sciences. University Publishing Office, Poznan University of Medical Science; 2001.
43. Van Delft-Schreurs CC, van Bergen JJ, de Jongh MA, van de Sande P, Verhofstad MH, de Vries J. Quality of life in severely injured patients depends on psychosocial factors rather than on severity or type of injury. Injury. 2014;45(1):320–6, http://dx.doi.org/10.1016/j.injury.2013.02.025.
44. Chevalier Z, Kennedy P, Sherlock O. Spinal cord injury, coping and psychological adjustment: a literature review. Spinal Cord. 2009;47:778–82.
45. Galvin LR, Godfrey HP. The impact of coping on emotional adjustment to spinal cord injury (SCI): review of the literature and application of a stress appraisal and coping formulation. Spinal Cord Off J Int Med Soc Paraplegia. 2001;39:615–27.
46. Kennedy P, Lude P, Elfström ML, Smoll FL. Cognitive appraisals, coping and quality of life outcomes: a multi-centre study of spinal cord injury rehabilitation. Spinal Cord. 2010;48:762–9.
47. Elfström M, Rydén A, Kreuter M, Taft C, Sullivan M. Relations between coping strategies and health-related quality of life in patients with spinal cord lesion. J Rehabil Med. 2005;37:9–16.
48. Strelau J. Temperament as a regulator of behavior: after fifty years of research. Eliot Werner Publications; 2008.
49. Dykas J, Terelak JF. Temperamental traits and styles of coping stress in motorcyclists. Polish J Aviat Med Psychol. 2014;20.
50. Van Leeuwen CM, Post MW, Hoekstra T, van der Woude LH, de Groot S, Snoek GJ, et al. Trajectories in the course of life satisfaction after spinal cord injury: Identification and predictors. Arch Phys Med Rehabil. 2011;92(2):207–13, http://dx.doi.org/10.1016/j.apmr.2010.10.011.