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Abstract

Purpose The aims of the study were (1) to examine the associations between the psychological resources general self-efficacy (GSE) and purpose in life (PIL), appraisals, coping and life satisfaction, and (2) to examine whether the effects of the psychological resources on life satisfaction are mediated by appraisals and coping, as proposed by the spinal cord injury adjustment model (SCIAM).

Methods Cross-sectional multicenter study conducted with persons with spinal cord injury (SCI) living in the community in Switzerland ($N = 516$). Pearson's correlations were calculated for aim 1, and structural equation modeling was conducted to address aim 2.

Results GSE ($r = .48$) and PIL ($r = .58$) were positively related to life satisfaction. The initial model corresponding to the SCIAM yielded a poor model fit. The final model had a good model fit [$\chi^2 = 66.0$, df = 21, $p < .01$, RMSEA = .065 (90 % confidence interval .048–.082), CFI = .97] explaining 57 % of variance of life satisfaction. PIL had a direct large effect on life satisfaction ($\beta = .54$). The influence of GSE on life satisfaction was mediated by loss appraisals. Avoidance, active and humor coping had small effects on life satisfaction.

Conclusions Psychological resources have a substantial effect on life satisfaction in persons with SCI. Our results correspond with the SCIAM and its conceptualization of adjustment as a multifactorial process, but did not fully support the hypothesized mediation. PIL was strongly related to higher life satisfaction and may be a suitable intervention target to support persons with SCI.

For the SwiSCI Study Group.

C. Peter (✉) · R. Müller · A. Cieza · M.
W. M. Post · C. M. C. van Leeuwen · S. Geyh
Swiss Paraplegic Research (SPF), Nottwil, Switzerland
e-mail: claudio.peter@paraplegie.ch

C. Peter · R. Müller · A. Cieza
Unit for Biopsychosocial Health, Department of Medical Informatics, Biometry and Epidemiology, Chair for Public Health and Health Care Research, Ludwig-Maximilians-University, Munich, Germany

M. W. M. Post · C. M. C. van Leeuwen
Brain Center Rudolf Magnus and Center of Excellence for Rehabilitation Medicine, University Medical Center Utrecht and De Hoogstraat, Utrecht, The Netherlands

C. S. Werner
Psychological Methods, Evaluation and Statistics, Department of Psychology, University of Zurich, Zurich, Switzerland

S. Geyh
Department Health Sciences and Health Policy, University of Lucerne and at SPF, Nottwil, Switzerland

Background

Spinal cord injury (SCI) is a health condition with profound detrimental consequences for the affected persons. SCI can result in permanent loss of motor and sensory function and affect bladder, bowel, sexual, and autonomic functions [1]. These severe body impairments reverberate on the activity and participation level, pose a substantial burden on the persons and can lower their life satisfaction [2, 3]. Hence, a comprehensive support and the promotion of best possible health and high life satisfaction represent key rehabilitation goals.
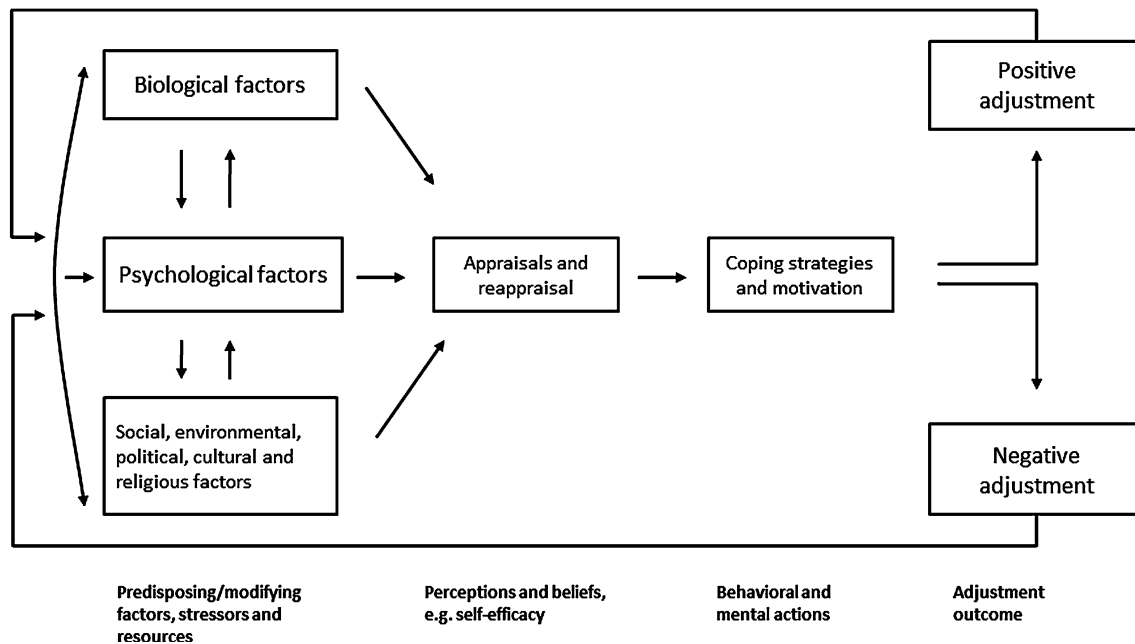
Fig. 1 The SCI Adjustment Model. Reprinted from: Middleton [14]. With permission from Nova Science Publishers, Inc.

Persons with SCI differ substantially in their satisfaction with life after SCI. Diverse trajectories in life satisfaction have been observed, indicating that some persons seem to maintain a comparably high life satisfaction throughout the years after SCI, while others show recovery of life satisfaction over time, or do not recover at all and constantly report low levels [4–6]. These differences cannot be solely accounted for by the extent of the bodily impairments or lesion-related characteristics. Rather, they result from a multifactorial adjustment process involving psychological, biological, or environmental factors [7–9].

Within this multifactorial process, psychological resources play an important role in determining life satisfaction of persons with SCI. Self-efficacy and self-esteem are the most well-documented examples for this finding [10, 11]. Few studies focused on other psychological resources such as purpose in life (PIL), but yielded promising results [12, 13].

The spinal cord injury adjustment model (SCIAM) was established to explain adjustment following SCI [14]. It is a complex model, in which predisposing psychological, biological, environmental factors as well as appraisal and coping processes act as determinants of adjustment outcomes, such as life satisfaction (Fig. 1). Psychological factors comprise the comparatively stable characteristics of a person, including psychological resources of a person. Examples are PIL, i.e., the degree to which an individual finds meaning in life [15], and general self-efficacy (GSE), defined as general beliefs in one's ability to respond to and control environmental demands [16]. Biological factors may include

severity of the lesion or functional impairments aroused by SCI. Factors, such as the health insurance system or social support, reflect potential environmental determinants of how persons adjust to SCI. These three factors interact and together influence SCI-related appraisals, i.e., how persons appraise SCI and its consequences. These SCI-specific appraisals, in turn, impact on subsequent coping behavior of the individuals. Finally, the adjustment outcomes, such as life satisfaction, depend on these prior coping processes. Altogether, coming back to the effect of psychological resources on life satisfaction, the SCIAM proposes a double-mediating mechanism: GSE/PIL→appraisals→coping→life satisfaction. Hence, persons with high GSE or PIL do not report higher life satisfaction as a consequence of a direct effect of these resources. Rather, their impact is indirect: GSE and PIL influence how an individual appraises SCI, hence what coping strategies will be consequently adopted and thus life satisfaction.

Although stronger psychological resources are consistently associated with higher life satisfaction [10, 11], studies examining the mechanism underlying the SCI adjustment process have hardly been conducted [17]. However, understanding these mechanisms would provide intervention targets to support persons in their adjustment to SCI. The SCIAM has been used as a theoretical framework [18], but has not been empirically tested.

We have used the SCIAM as guiding framework for our research program, aiming to investigate how psychological resources influence adjustment to SCI [19]. Extending this work, the aims of the current study are (1)

to examine the associations between the psychological resources GSE and PIL, appraisals, coping and life satisfaction, and (2) to examine whether the effects of psychological resources on life satisfaction are mediated by appraisals and coping, as proposed by the SCIAM.

Regarding aim 1, we hypothesize that stronger psychological resources are associated with higher life satisfaction. Concerning aim 2, we hypothesize that appraisals and coping styles mediate the impact of the psychological resources on life satisfaction.

Methods

Study design

A community-based cross-sectional survey was conducted as a nested project within the nationwide Swiss Spinal Cord Injury Cohort study (SwiSCI). The design of the larger SwiSCI cohort study is described in detail elsewhere [20].

Participants

Persons with a traumatic or nontraumatic SCI, aged 16 years or older, and living in the community in Switzerland were eligible for SwiSCI. Persons with congenital conditions, such as spina bifida, new SCI in the context of palliative care, or neurodegenerative disorders such as multiple sclerosis, were excluded from the cohort study. SwiSCI recruits participants by screening the medical records of the four specialized Swiss SCI rehabilitation centers (REHAB Basel, Spinal Cord Injury Center of the Balgrist University Hospital, Zürich, the Clinique Romande de Réadaptation, Sion and the Swiss Paraplegic Centre, Nottwil) and the member lists of two SCI associations (Swiss Paraplegic Association SPV, Parahelp). Every participant signed an informed consent form. The study accords to the ethical standards of the Declaration of Helsinki (1964) and was approved by all ethical committees.

Procedures

Self-report questionnaires were sent to all eligible persons by postal mail in three waves. First, information about SwiSCI, the informed consent form, and a brief questionnaire about socio-demographic and lesion-related variables were sent. Persons who completed the first questionnaire and agreed to participate in SwiSCI received a second, comprehensive questionnaire on health, functioning and well-being. A stratified randomized sample from the respondents of the second questionnaire (38 %) was drawn controlling for gender, age, and level of lesion (para- vs. tetraplegia). This sample received a third questionnaire, which includes the measures used in this study.

Measurement instruments

Data on socio-demographic (age, gender, education, marital status) and lesion-related variables (time since SCI, lesion type, cause of SCI) were collected. Type of lesion includes the lesion level (para- vs. tetraplegia) and the completeness of lesion (complete vs. incomplete lesion). The cause of SCI can be traumatic (e.g., accident) or nontraumatic (e.g., internal bleeding).

Psychological resources

Purpose in life   PIL, i.e., the degree to which individuals find meaning in their lives [15], was measured with the Purpose in Life Test–Short Form (PIL-SF) [21] which is based on the original 20-item Purpose in Life Scale [22]. The PIL-SF consists of four 7-point Likert-type items using different anchors for each item. The sum score ranges from 4 to 28, with higher scores indicating higher PIL. Good internal consistency and validity have been reported [21].

General self-efficacy   GSE, i.e., the general belief in one's ability to respond to situational demands [16], was measured with the General Self-Efficacy Scale (GSES) [16]. It consists of ten 4-point Likert-type items. The total score ranges from 10 to 40, with higher scores denoting higher self-efficacy levels. Good convergent and discriminant validity have been reported [23]. The measure has been frequently used in SCI research [24–26].

Appraisals and coping

Appraisals   Primary appraisals, i.e., the cognitive evaluation of a specific stimulus, were measured with the Appraisal of Life Events Scale (ALE). Using 16 adjectives person's responded how they appraised difficult life events in the past 3 months on a 6-point scale. The adjectives refer to three dimensions: threat (e.g., "terrifying"), challenge (e.g., "stimulating"), and loss (e.g., "pitiful"). The total scores range from 0 to 20 (loss), or 0 to 30, respectively (threat, challenge). Higher scores indicate higher appraisal levels. Good internal reliability and convergent validity have been reported [27, 28]. The ALE has been successfully used in SCI research [18, 29].

Coping   Coping encompasses the efforts that are used to handle the demands caused by a stressful situation. The

Brief COPE was used to assess how persons were dealing with stressful situations in their lives [30]. It consists of 28 items with a 4-Likert scale and encompasses 14 subscales (self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame). Total scores per subscale range from 2 to 8, with higher scores indicating more use of the specific coping strategy. Satisfactory internal reliability estimates have been reported [30].

Adjustment outcome

Life satisfaction   Life satisfaction was measured with five selected 5-point Likert scale items from the WHOQoL BREF [31]. They cover the overall life satisfaction as well as satisfaction in specific life domains, i.e., health, social relationships, daily activities, and living conditions. The total score ranges from 5 to 25, with higher scores indicating higher life satisfaction. Unidimensionality and cross-cultural validity have been reported for the SCI population [32].

Existing validated German, French, and Italian versions of all measurement instruments were used. French and Italian versions of the PIL-SF and the ALE were not available and translated using a forward translation procedure. All three language versions of all measures, including the validated instruments, were harmonized in parallel in group sessions by bilingual persons. This harmonization process included the validated measures, because they were not necessarily consistent, although based on the same English original measure (e.g., items with additional words or subsets). The changes consisted of deletion/adding of item subsets and word replacements in the French and Italian versions.

Analyses

Regarding aim 1, Pearson's correlations were calculated in SPSS to identify the associations between the psychological resources, appraisals, coping and life satisfaction. Concerning aim 2, structural equation modeling (SEM) was conducted using the free statistics environment "R" [33] and its "lavaan" package [version 0.5–12; 34]. SEM combines factor analysis with path analysis. Factor-analytic measurement models describe how unobservable latent variables (constructs) are measured by observed variables. The structural path model describes the interrelations among the latent variables [35].

Model complexity including the number of observed variables and model estimation method are factors contributing to the need for large samples for SEM. Overall, 10–20 participants per observed variable or a sample of at least 200 persons are considered adequate [36]. We were

specifically interested in the interrelations between PIL, GSE, loss, threat, and challenge appraisals and coping. In order to attain an adequate ratio between the sample size and the number of variables included in the model, we defined these variables as observed variables and not as latent variables representing broader, general constructs.

First, because broader dimensions of the Brief COPE have been reported, the factorial structure of the measure was examined [37, 38]. Using the "R" package "psych" [version 1.2.8; 39], a parallel exploratory factor analysis (EFA; principal axis analysis) using an oblique rotation (promax) was performed using the 28 items, yielding a 6-factor solution with 45.2 % explained variance. The six factors were labeled: (1) Emotional coping and support, (2) Avoidance, (3) Substance use, (4) Religious coping, (5) Active coping, and (6) Humor. This 6-factor structure of the Brief COPE items has not been previously reported [37]. The items of the six factors were summed up and treated, as indicated above, as observed variables.

Life satisfaction was modeled as a latent variable using an item parceling procedure. In contrast to observed variables, latent variables take into account measurement error and hence reduce potential bias of the estimated parameters [40], but at the cost of increased model complexity. Hence, by modeling life satisfaction as a latent variable, we reduced potential biases of the paths directly connected to life satisfaction, while keeping model complexity at a reasonable level.

The allocation of the items to the parcels was based on the content they cover: The general life satisfaction item constituted the first parcel, the sum of the other four domain-specific life satisfaction items referring to health, social relationships, daily activities, and living conditions, constituted the second parcel.

Secondly, the structural equation model was specified. Based on the SCIAM [14], a double-mediation model was defined: PIL/GSE→appraisals→coping→life satisfaction (Fig. 2). Full information maximum likelihood (FIML) was used for model estimation, based on raw data. FIML analyzes partially missing data without imputing missing values [41]. Chi square (χ^2) and root-mean-square error of approximation (RMSEA) were used to evaluate how well the data globally fit the theorized model. A nonsignificant χ^2 and a RMSEA <0.06 indicate good fit [35, 42]. The comparative fit index (CFI) was used for further model assessment, with values >0.95 indicating good fit [42].

Models can be modified based on the examination of the standardized residuals (SRs). SRs are calculated for every bivariate association between all model variables. An SR >2 indicates a significant difference between model and data with regard to that specific bivariate relationship, i.e., a bivariate relationship is weaker or stronger than produced
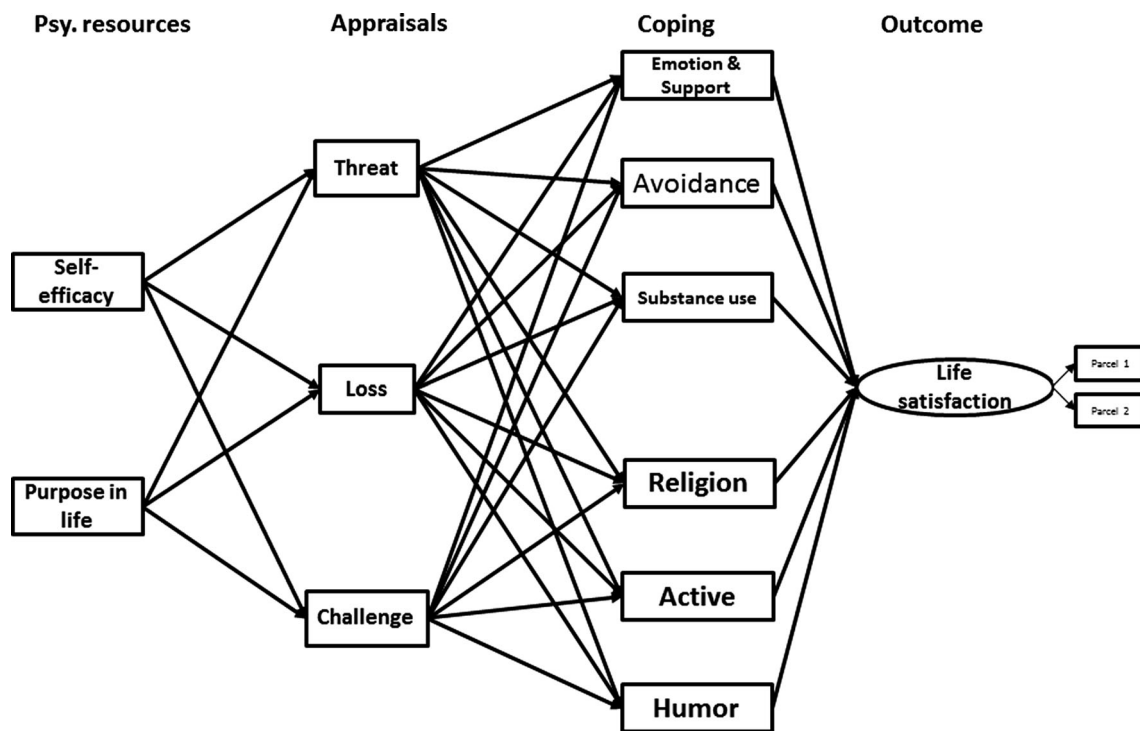
Fig. 2 Initial structural equation model based on the SCIAM consisting of psychological resources, appraisals, coping and life satisfaction. Initial model is based on the Spinal Cord Injury Adjustment Model (SCIAM), Adjustment is operationalized with life satisfaction, and for clarity of graph, the following correlations are not depicted: Self-efficacy–Purpose in life; Threat–Loss; Loss–Challenge; Emotion and support–Active; Emotion and support–Avoidance; Active–Humor; Humor–Avoidance; and Avoidance–Substance use

in the model. It hence points toward the deletion or adding of a path in the model. The highest SR was considered first.

The power to detect model misspecification and power to test effects were investigated [43]. To test the effects of the paths, a post hoc Monte Carlo power analyses using the simsem package in "R" [44] was conducted. A power level of .80 was considered adequate [45].

Furthermore, to test the potential impact of socio-demographic and lesion-related variables (gender: male vs female, time since injury: short vs long, lesion level: paraplegia vs tetraplegia, completeness of lesion: complete vs incomplete) on the stability of the path coefficients, we conducted exploratory post hoc subgroup comparisons of the final model. A model in which the path parameters were allowed to differ between the two subgroups was compared to a model assuming identical path parameters across both groups. A significant χ^2 test indicates parameter instability across the subgroups.

Results

A total of 3,144 eligible persons were contacted for the first questionnaire wave, and 1,922 persons responded (response rate of 61.1 %). In study wave 2, 1,549 persons participated (82.6 %). Thirty-eight percent (589) of the respondents of the second SwiSCI questionnaire were assigned to the present study. In the end, 516 persons (87.6 %) participated in our study, which is an adequate sample size for SEM analyses considering the number of observed variables in the initial structural equation model [35].

Study participants were mainly male (72.1 %), 53.1 years old, paraplegic (67.5 %) and lived more than 17 years with their injury (Table 1). Table 2 lists the score range and mean for each measured construct.

Regarding aim 1, the correlations between the assessed variables can be found in Table 3. Life satisfaction was positively associated with GSE ($r = .48$) and PIL ($r = .58$), and negatively with loss ($r = -.48$) and threat appraisals ($r = -.41$). Of all EFA-based coping subscales, life satisfaction had the strongest association with avoidance ($r = -.39$) and humor ($r = .30$). Among the EFA-based coping subscales, the correlation between active coping and humor yielded the highest absolute coefficient value ($r = .35$).

Regarding aim 2, the initial model corresponding to the SCIAM (Fig. 1) yielded a poor model fit with $\chi^2 = 480.35$, df = 38, $p < .01$, RMSEA = 0.151, CFI = .73. Based on SRs, the model was modified by adding the following paths: (1) from GSE and PIL to active coping, (2) from PIL to life satisfaction, (3) from GSE to humor, (4) from loss to life satisfaction, (5) from PIL to religious coping, (6) from

Table 1 Descriptive characteristics of study participants ($N = 516$)

	Participants n (%)
Gender	
Male	372 (72.1)
Female	144 (27.9)
Missings	0
Marital status	
Single (never married)	158 (30.5)
Married	258 (50.0)
Widowed	70 (13.6)
Divorced	23 (4.5)
Reg. partnership	2 (0.4)
Missings	5 (1.0)
Age [mean (SD) in years]	53.1 (14.6)
Missings	28 (5.4)
Education [mean (SD) in years]	13.8 (3.3)
Missings	12 (2.3)
Time since injury [mean (SD) in years]	17.6 (13.6)
Missings	44 (8.5)
Type of lesion	
Complete paraplegia	166 (32.2)
Complete tetraplegia	57 (11.0)
Incomplete paraplegia	182 (35.3)
Incomplete tetraplegia	102 (19.8)
Missings	9 (1.7)
Cause of injury	
Traumatic	400 (77.5)
Nontraumatic	88 (17.1)
Unspecified	27 (5.2)
Missings	1 (0.2)
Language of questionnaire	
German	364 (70.5)
French	131 (25.4)
Italian	21 (4.1)
Missings	0

SD standard deviation

PIL to avoidance, and (7) intercorrelations between all six coping factors. No paths were deleted. This yielded a final model with a good model fit ($\chi^2 = 66.0$, df = 21, $p < .01$, RMSEA = .065 [90 % confidence interval .048–.082], CFI = .97) explaining 57 % of variance of life satisfaction (Fig. 3).

In the final model, the influence of GSE on life satisfaction was indirect and mediated by loss appraisals (indirect effect of $\beta = .08$; attained by multiplying the coefficients of the involved paths, hence GSE-loss $-.31 \times$ loss-life satisfaction $-.27$), by humor ($\beta = .04$), by challenge and humor ($\beta = .01$), and by active coping ($\beta = -.03$). The relationship between PIL on life satisfaction was direct with a large effect ($\beta = .54$). PIL was also indirectly related to life satisfaction via two pathways: First, via challenge appraisal and humor ($\beta = .01$: with PIL–challenge: $\beta = .26$; challenge–humor: $\beta = .26$; humor–life satisfaction: $\beta = .12$), and secondly via active coping ($\beta = -.03$; with PIL–active coping: $\beta = .31$; active coping–life satisfaction: $\beta = -.10$), overall indicating a partial mediation effect.

The path from loss appraisals to life satisfaction indicating a moderate effect ($\beta = -.27$) was the only direct association of appraisals with life satisfaction. Of the six coping strategies, avoidance ($\beta = -.17$), active coping ($\beta = -.10$) and humor ($\beta = -.12$) significantly influenced life satisfaction levels, however, with small effects (Table 4).

The power for detection of model misspecification was above 0.80 for the final model [43]. The test of the effects yielded an average effect power of 0.71. Post hoc exploratory subgroup comparisons for gender, level and completeness of lesion were nonsignificant, indicating stable path coefficients. Significant group differences were found for time since injury. Comparing the parameter estimates of the two groups yielded considerably stronger direct effects of PIL and humor on life satisfaction for individuals with a shorter time since injury (PIL: $\beta_{\text{short}} = .57$ vs. $\beta_{\text{long}} = .48$; humor: $\beta_{\text{short}} = .15$ vs. $\beta_{\text{long}} = .09$).

Discussion

This study examined how the psychological resources GSE and PIL interact with appraisals, coping and life satisfaction. The first hypothesis was supported: Persons with higher GSE and PIL reported higher life satisfaction. The second hypothesis was not fully supported. Psychological resources had a direct and indirect positive impact on person's life satisfaction, and the strongest path in the model was a direct relationship between PIL and life satisfaction. Our results support the SCIAM and its conceptualization of adjustment as a multifactorial process, as many variables were directly or indirectly involved in the determination of life satisfaction. However, the double-mediating process was not fully supported.

Persons with higher PIL and GSE reported higher life satisfaction. The relationship between higher life satisfaction and threat and loss appraisal is negative, but positive with challenge appraisals. The directions and the strength of these associations correspond with the findings of previous studies [13, 18, 46–48]. Among the six coping factors, avoidance and humor had a moderate bivariate link with life satisfaction. Earlier SCI studies using the same coping measure identified positive reframing and behavioral disengagement as being related to adjustment. Although items of these two original subscales are incorporated in the six

Table 2 Descriptive characteristics of psychological resources, appraisals, coping and life satisfaction (N = 516)

Variable (measure)	Range	Mean (SD)	Missings n (%)	Cronbach's α	Skewness	Kurtosis	Extreme scores[a] Floor n (%)	Ceiling n (%)
Psychological resources								
General self-efficacy (*GSES*)	10–40	30.4 (5.6)	28 (5.4)	.91	−.66	.56	1 (0.2)	16 (3.1)
Purpose in life (*PIL-SF*)	4–28	21.3 (4.6)	17 (3.3)	.89	−.95	.79	2 (0.4)	28 (4.5)
Mediating variables								
Appraisals (*ALE*)								
Challenge	0–30	12.9 (7.0)	50 (9.7)	.85	−.10	−.87	23 (4.5)	0 (0.0)
Loss	0–20	6.9 (4.9)	47 (9.1)	.82	.48	−.56	45 (8.7)	4 (0.8)
Threat	0–30	9.5 (6.7)	47 (9.1)	.86	.47	−.60	29 (5.6)	0 (0.0)
Coping (*Brief COPE, EFA-based subscales*)								
Emotion and support	6–24	12.3 (3.7)	20 (3.9)	.83	.52	.14	22 (4.3)	1 (0.2)
Avoidance	8–32	14.3 (3.7)	35 (6.8)	.67	.67	.61	16 (3.1)	0 (0.0)
Substance use	2–8	2.6 (1.2)	10 (1.9)	.92	2.42	6.10	375 (72.7)	6 (1.2)
Religion	2–8	3.8 (2.0)	17 (3.3)	.89	.88	−.46	206 (39.9)	39 (7.6)
Active	5–20	14.4 (3.0)	29 (5.6)	.71	−.25	−.30	1 (0.2)	17 (3.3)
Humor	3–12	6.8 (2.2)	17 (3.3)	.67	.31	−.62	31 (6.0)	11 (2.1)
Adjustment outcome								
Life satisfaction (*WHO-QOL BREF, selected items*)	5–25	18.1	32 (6.2)	0.79	−.63	.38	1 (0.2)	16 (3.1)

[a] Extreme scores refer to proportion of participants with lowest/highest possible sum score. Missings refer to missing total scores. Little MCAR's test was significant ($p < .001$), indicating that data were not missing completely at random (MCAR). After additional analyses of the pattern of missing data, the data were treated as Missing at Random (MAR)

EFA-based coping factors of the present study (avoidance containing items of behavioral disengagement; humor consisting of one item of positive reframing), results are not comparable, because adjustment was operationalized by mental health variables in other studies [29, 49].

PIL was the strongest predictor of high life satisfaction. Similar findings were found in cross-sectional studies with a multivariate design including psychological and biological factors as potential adjustment determinants: PIL significantly predicted adjustment [12, 50] and psychological well-being [13]. GSE had an indirect effect on life satisfaction. This indirect influence is in line with the SCIAM; however, it might still come as a surprise because bivariate associations between high self-efficacy and high well-being are consistently reported [10]. Multivariate analyses, however, do not show a clear picture: GSE was not consistently a significant predictor of well-being over and above other psychological and environmental factors [25, 47, 48, 51]. A longitudinal study showed that well-being was determined by the persons' mood, health competence, and family support, and not by GSE [25].

Although appraisals are seen as holding a central role in the adjustment process, their effect on adjustment in this study remained comparatively weak. In line with the SCIAM model, the effects of threat, loss, and challenge were mostly mediated by coping. Only loss appraisal had a direct moderate effect on life satisfaction. Research has repeatedly shown that appraisals determine an individual's life satisfaction, but has not examined whether coping mediates the effect of appraisals on life satisfaction [e.g., 17, 29]. Overall, findings regarding appraisals partly diverge. For example, threat appraisal predicted lower psychological quality of life measured 12 weeks after injury in a multivariate analysis including appraisals, psychological factors, and coping as potential determinants. In the follow-up study, however, loss and not threat appraisal significantly predicted lower quality of life [18, 29]. Because loss and threat correlate and conceptually overlap, they both might be indicators of a potentially negative long-term adjustment. The extent to which persons with SCI appraise their injury as loss or threat decreases during clinical first rehabilitation [29]. However, whether such a reduction over time is connected to increases in life satisfaction has yet to be tested.

Our study findings suggest that coping only plays a minor role when adjusting to stressful situations after SCI. The paths from avoidance, active and humor coping to life satisfaction were significant, but had a small effect. The results reflect the somewhat inconclusive findings with

Table 3 Pearson's correlations between psychological resources, appraisals, coping (6 EFA-based subscales) and life satisfaction ($N = 516$)

	1	2	3	4	5	6	7	8	9	10	11	12
1 Life satisfaction	1.00											
2 Self-efficacy	0.48*	1.00										
3 Purpose in life	0.58*	0.55*	1.00									
4 Challenge	0.30*	0.32*	0.35*	1.00								
5 Loss	−0.48*	−0.40*	−0.31*	−0.22*	1.00							
6 Threat	−0.41*	−0.34*	−0.24*	−0.08	0.71*	1.00						
7 Support	−0.12+	−0.04	0.03	0.08	0.30*	0.28*	1.00					
8 Active Coping	0.25*	0.45*	0.48*	0.24*	−0.04	−0.02	0.23*	1.00				
9 Avoidance	−0.39*	−0.32*	−0.28*	−0.08	0.42*	0.38*	0.27*	−0.11+	1.00			
10 Humor	0.30*	0.42*	0.32*	0.35*	−0.19*	−0.17*	0.06	0.35*	−0.23*	1.00		
11 Religion	−0.06	−0.11+	0.11+	0.08	0.27*	0.26*	0.19*	0.19*	0.10+	0.01	1.00	
12 Substance use	−0.14*	−0.13*	−0.14*	0.01	0.15*	0.11+	0.10+	−0.14*	0.24*	0.04	−0.08	1.00

* $p < .01$; + $p < .05$. Partial correlation coefficients, controlling for socio-demographic and lesion-related variables, were also calculated, yielding a maximum difference of .054 and a mean difference of .018 from current correlation coefficients
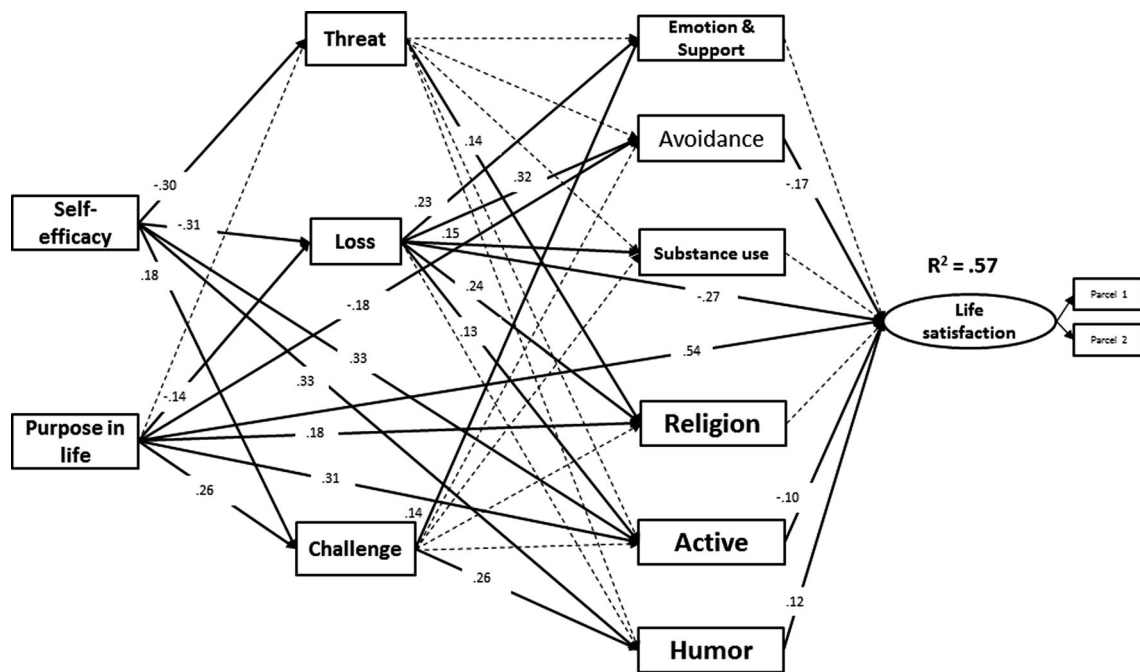
Fig. 3 Final structural equation model with life satisfaction as adjustment outcome variable. $\chi^2 = 66$, df = 21, $p < .01$, RMSEA = .065 (90 % CI .048– .082), CFI = .97. R^2 = proportion of explained variance. *Note* Paths with a dotted line are not significant. For clarity of graph, the correlations between all six coping subscales, as well as between Threat and Loss, and Loss and Challenge, and self-efficacy and purpose in life are not depicted

regard to coping in SCI: Different coping strategies are connected to different adjustment outcomes, but the identification of a clear pattern within these associations is lacking [52]. However, approach-oriented, and not avoidance-oriented coping is generally connected with better adjustment following SCI [53]. A focus shift away from the concrete coping strategies to the examination of coping flexibility was proposed [54]. Following this line of thought, persons flexibly using different coping strategies

matching the requirements of the specific situation optimize their adjustment to SCI.

Coping might have had a stronger effect on life satisfaction in presence of an immediate stressor, such as in the clinical rehabilitation setting where challenges due to SCI are more prevailing [29]. A stronger effect could be expected, if coping was connected to a specific, present SCI-related stressor, such as vocational re-education, with the questionnaire instruction. We disclaimed this idea, because (1) not all persons

Table 4 Path coefficients of the final SE model

Outcome	Unstandardized	SE	95 % CI		Standardized
Path to outcome			Lower bound	Upper bound	
Life satisfaction					
Support	.001	.007	−.013	.015	.006
Active	−.024[+]	.012	−.047	.000	−.097
Avoidance	−.031*	.008	−.048	−.015	−.164
Humor	.037*	.014	.010	.065	.118
Religion	−.002	.015	−.032	.028	−.006
Substance use	−.006	.023	−.051	.040	−.009
Purpose in life	.081*	.008	.065	.097	.529
Loss	−.039*	.007	−.053	−.025	−.271
Support					
Challenge	.074*	.025	.025	.123	.141
Loss	.169*	.056	.060	.278	.227
Threat	.071	.038	−.003	.145	.130
Active					
Challenge	.028	.019	−.008	.064	.067
Loss	.079[+]	.034	.011	.079	.133
Threat	.029	.024	−.017	.076	.067
Self-efficacy	.171*	.027	.118	.225	.329
Purpose in life	.194*	.034	.128	.261	.308
Avoidance					
Challenge	.029	.024	−.019	.077	.055
Loss	.219*	.067	.087	.352	.292
Threat	.066	.043	−.018	.150	.119
Purpose in life	−.140*	.044	−.226	−.053	−.175
Humor					
Challenge	.081*	.015	.052	.110	.253
Loss	.027	.029	−.030	.084	.059
Threat	−.023	.019	−.061	.014	−.070
Self-efficacy	.136*	.019	.099	.172	.340
Religion					
Challenge	.021	.013	−.004	.046	.074
Loss	.096*	.027	.043	.149	.241
Threat	.040[+]	.020	.001	.078	.135
Purpose in life	.075*	.020	.037	.114	.178
Substance use					
Challenge	.008	.009	−.010	.026	.047
Loss	.036*	.015	.005	.066	.148
Threat	.002	.011	−.021	.024	.009
Challenge					
Self-efficacy	.219*	.068	.085	.353	.176
Purpose in life	.395*	.079	.240	.549	.262
Loss					
Self-efficacy	−.272*	.047	−.365	−.180	−.311
Purpose in life	−.141*	.059	−.256	−.026	−.133
Threat					
Self-efficacy	−.360*	.066	−.489	−.230	−.302
Purpose in life	−.099	.084	−.263	.065	−.069

* $p < .01$; [+] $p < .05$

experience the same stressors and (2) because SwiSCI-internal pretests indicated that persons living with SCI for years do not necessarily perceive SCI and related aspects as stressors anymore. Nonetheless, the common sense model [55] could be used as a reference for the identification of distinct SCI-related stressors in future data collections [56]. It enumerates several important characteristics of a stress-causing situation, such as time line or duration (acute, cyclic, chronic), causes (e.g., genetic, infection, food poisoning), consequences (e.g., fatal, painful), or controllability (e.g., susceptible to medical treatment).

Humor was the only coping strategy with a significant positive effect on life satisfaction. Research regarding humor in SCI is scarce and focuses mainly on its use as coping strategy [e.g., 57]. Considerable efforts have been directed toward the examination of the link between humor and health across different patient groups, but without yielding consistent results [58]. Preliminary results of an internet-based intervention showed that strengthening humor is connected with increases in life satisfaction [59]. Overall, an enhanced focus on humor in the adjustment process after SCI seems indicated, especially in persons with shorter time since injury, as indicated by our exploratory subgroup analyses.

Our findings need to be interpreted under consideration of our conceptualization and operationalization of the SCIAM and the study sample. First, the SCIAM and its components are not fully represented. Sample size, model complexity, and participant burden considerations guided the number of variables that were assessed and included in our model. Due to our focus on the role of psychological resources and their interrelation with appraisals and coping strategies, we did not include environmental or biological factors, nor a concrete SCI-related stressor in the model. To fully understand the SCI adjustment mechanism and the interaction among its components, these factors should be incorporated in future studies. However, our subgroup analyses showed that parameter estimates are unlikely to be biased by socio-demographic and lesion-related characteristics, while a theory-driven examination of time since injury seems indicated.

Secondly, the SCIAM depicts a process that starts right after SCI and thus might be especially applicable for the immediate rehabilitation context and the first years after injury. The current study, however, was conducted in the community setting with persons who had lived with SCI for many years. Data stemming from persons with newly acquired SCI are needed to support our findings.

Third, the SCIAM and its model components can be operationalized differently. We operationalized the psychological component with PIL and GSE, conceptualizing them as comparably stable-trait-like factors. However, other factors, such as optimism or personality traits, could be used as representatives. Similarly, we assessed primary appraisals

because they have been identified as predictors of well-being [18, 29], but did not consider other important health-related appraisals, such as catastrophizing thoughts. Further, we used a generic, broad coping measure and decided against the use of a SCI-related coping measure due to the community setting, as indicated above. Overall, further research examining the SCIAM is needed, especially in the context of acute or post-acute first rehabilitation and preferably with SCI-specific appraisal and coping measures.

Regarding the analysis strategy in this study, our model-testing approach could be complemented by adoption of an exploratory, bottom-up SEM approach, in which a model is built by model comparison and by adding different components step-by-step. This approach might yield a more parsimonious, better fitting model. However, problems with such an approach include capitalization on chance. In these cases, results are completely data-driven, thus sample-specific, not generalizable, and needing cross-validation [36]. Further, future studies utilizing larger samples could use latent variables to test the SCIAM to minimize parameter bias that might be present between the observed variables in our model.

Clinical implications

Our results suggest that persons who have goals and a purpose in their life, who have belief in their ability to respond to environmental demands, and who don't appraise stressful situations as loss are more satisfied in their life. Screening for persons with SCI with low PIL or GSE might thus help to identify persons who are at risk for low life satisfaction. Strengthening PIL and GSE, and targeting the appraisals of persons with SCI could represent promising interventions to increase life satisfaction.

Different methods have been applied to enhance these factors across various populations; however, not all attempts brought fruitful results. A psychosocial counseling intervention or purposeful reminiscences including meeting past friends did not change PIL in individuals with cancer or HIV [60, 61]. Good effects, however, were found for the Acceptance and Commitment Therapy (ACT) across a wide range of populations affected by psychological problems [62–64]. The clarification and the active orientation toward personal goals, aspects conceptually close to PIL, are a key ingredient of ACT. However, it is unclear whether ACT could also contribute to better long-term adjustment following SCI.

Improvements in self-efficacy of persons with SCI have been achieved with an active/independent living program [65, 66], physical activity or sports programs [e.g., 26], or a wellness workshop intervention [67]. Cognitive appraisals are frequently addressed in cognitive behavioral interventions. For example, a coping effectiveness training (CET)

Program incorporating cognitive behavioral therapy techniques yielded to changes in participants' negative appraisals of the consequences of SCI [68].

Study limitations

This study is subject to several limitations. First, the study is of cross-sectional design. Although the structural models indicate paths from one variable to another, causality cannot be inferred. Secondly, results are based on a community sample of the Swiss population and are not generalizable to the entire SCI population. Third, a preliminary defined model was tested. However, modified models are to some extent data-driven and exploratory in nature and cannot be generalized. The final model should be cross-validated.

Conclusions

This study suggests that psychological resources have a substantial effect on life satisfaction. Our results were in line with the SCIAM and its conceptualization of adjustment as a multifactorial process, but did not fully support the hypothesized mediating process. PIL was strongly related to higher life satisfaction and seems to be, together with GSE and appraisals, a suitable target to support persons with SCI. Longitudinal data integrating a broad range of components and specifically focusing on how newly injured persons with SCI adjust to their lesion is needed to support our findings and to more accurately describe adjustment following SCI.

References

1. Kirshblum, S., Campagnolo, D. I., & DeLisa, J. A. (2002). *Spinal Cord Medicine*. Philadelphia: Lippincott Williams & Wilkins.

2. Post, M. W., Van Dijk, A. J., Van Asbeck, F. W., & Schrijvers, A. J. (1998). Life satisfaction of persons with spinal cord injury compared to a population group. *Scandinavian Journal of Rehabilitation Medicine, 30*(1), 23–30.

3. Dijkers, M. (1997). Quality of life after spinal cord injury: A meta analysis of the effects of disablement components. *Spinal Cord, 35*(12), 829–840.

4. van Leeuwen, C. M., Post, M. W., Hoekstra, T., van der Woude, L. H., de Groot, S., Snoek, G. J., et al. (2011). Trajectories in the course of life satisfaction after spinal cord injury: Identification and predictors. *Archives of Physical Medicine and Rehabilitation, 92*(2), 207–213.

5. Stensman, R. (1994). Adjustment to traumatic spinal cord injury. A longitudinal study of self-reported quality of life. *Paraplegia, 32*(6), 416–422.

6. Putzke, J. D., Barrett, J. J., Richards, J. S., Underhill, A. T., & Lobello, S. G. (2004). Life satisfaction following spinal cord injury: Long-term follow-up. *Journal of Spinal Cord Medicine, 27*(2), 106–110.

7. Chevalier, Z., Kennedy, P., & Sherlock, O. (2009). Spinal cord injury, coping and psychological adjustment: A literature review. *Spinal Cord, 47*(11), 778–782.

8. North, N. T. (1999). The psychological effects of spinal cord injury: A review. *Spinal Cord, 37*(10), 671–679.

9. Post, M. W., de Witte, L. P., van Asbeck, F. W., van Dijk, A. J., & Schrijvers, A. J. (1998). Predictors of health status and life satisfaction in spinal cord injury. *Archives of Physical Medicine and Rehabilitation, 79*(4), 395–401.

10. Peter, C., Muller, R., Cieza, A., & Geyh, S. (2012). Psychological resources in spinal cord injury: A systematic literature review. *Spinal Cord, 50*(3), 188–201.

11. van Leeuwen, C. M., Kraaijeveld, S., Lindeman, E., & Post, M. W. (2012). Associations between psychological factors and quality of life ratings in persons with spinal cord injury: A systematic review. *Spinal Cord, 50*(3), 174–187.

12. Mona, L. R., Krause, J. S., Norris, F. H., Cameron, R. P., Kalichman, S. C., & Lesondak, L. M. (2000). Sexual expression following spinal cord injury. *NeuroRehabilitation, 15*(2), 121–131.

13. de Roon-Cassini, T. A., de St Aubin, E., Valvano, A., Hastings, J., & Horn, P. (2009). Psychological well-being after spinal cord injury: Perception of loss and meaning making. *Rehabilitation Psychology, 54*(3), 306–314.

14. Middleton, J., & Craig, A. (2008). Psychological challenges in treating persons with spinal cord injury. In A. Craig & Y. Tran (Eds.), *Psychological aspects associated with spinal cord injury rehabilitation: New directions and best evidence* (pp. 3–53). New York: Nova Science Publishers Inc.

15. Frankl, V. E. (1959). *Man's search for meaning*. NewYork: Washington Square Press.

16. Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). Windsor, UK: NFER-NELSON.

17. van Leeuwen, C. M., Post, M. W., Westers, P., van der Woude, L. H., de Groot, S., Sluis, T., et al. (2012). Relationships between activities, participation, personal factors, mental health, and life satisfaction in persons with spinal cord injury. *Archives of Physical Medicine and Rehabilitation, 93*(1), 82–89.

18. Kennedy, P., Lude, P., Elfström, M. L., & Smithson, E. (2010). Sense of coherence and psychological quality of life in people with spinal cord injury: Appraisals and behavioural responses. *British Journal of Health Psychology, 15*, 611–621.

19. Peter, C., Müller, R., Post, M. W., van Leeuwen, C. M., Werner, C. S., & Geyh, S. (2014). Psychological resources, appraisals and coping and their relationship to participation in spinal cord injury: A path analysis. *Archives of Physical Medicine and Rehabilitation*.

20. Post, M. W., Brinkhof, M., von Elm, E., Boldt, C., Brach, M., Muff, C., et al. (2011). Design of the swiss spinal cord injury

cohort study. *American Journal of Physical Medicine and Rehabilitation, 90*(11 Suppl 2), S5–S16.

21. Schulenberg, S. E., Schnetzer, L. W., & Buchanan, E. M. (2011). The purpose in life test-short form: Development and psychometric support. *Journal of Happiness Studies, 12*, 861–876.

22. Crumbaugh, J. C., & Maholick, L. T. (1964). An experimental study in existentialism: The psychometric approach to Frankl's concept of noogenic neurosis. *Journal of Clinical Psychology, 20*(2), 200–207.

23. Schwarzer, R., Bäßler, J., Kwiatek, P., & Schröder, K. (1997). The assessment of optimistic self-beliefs: Comparison of the German, Spanish, and Chinese versions of the General Self-efficacy Scale. *Applied Psychology International Review, 46*(1), 69–88.

24. Spungen, M. I., Libin, A., Ljungberg, I., & Groah, S. (2009). Self-efficacy mediating the occurrence of secondary conditions after spinal cord injury. *SCI Psychosocial Process, 22*(1), 16–22.

25. Mortenson, W. B., Noreau, L., & Miller, W. C. (2010). The relationship between and predictors of quality of life after spinal cord injury at 3 and 15 months after discharge. *Spinal Cord, 48*(1), 73–79.

26. Kennedy, P., Taylor, N., & Hindson, L. (2006). A pilot investigation of a psychosocial activity course for people with spinal cord injuries. *Psychology, Health & Medicine, 11*(1), 91–99.

27. Ferguson, E., Matthews, G., & Cox, T. (1999). The appraisal of life events (ALE) scale: Reliability and validity. *British Journal of Health Psychology, 4*(Part 2), 97–116.

28. Gourounti, K., Anagnostopoulos, F., & Vaslamatzis, G. (2010). Primary appraisal of infertility: Evaluation of the psychometric properties of a Greek version of the appraisal of life events scale (ALE) in a sample of infertile women undergoing fertility treatment. *Women and Health, 50*(7), 688–704.

29. Kennedy, P., Lude, P., Elfstrom, M. L., & Smithson, E. (2010). Cognitive appraisals, coping and quality of life outcomes: A multi-centre study of spinal cord injury rehabilitation. *Spinal Cord, 48*(10), 762–769.

30. Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioral Medicine, 4*(1), 92–100.

31. WHOQOL Group (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychological Medicine, 28*(3), 551–558.

32. Geyh, S., Fellinghauer, B. A. G., Kirchberger, I., & Post, M. W. M. (2010). Cross-cultural validity of four quality of life scales in persons with spinal cord injury. *Health and Quality of Life Outcomes, 8*(94), 1–16.

33. R Core Team. (2012). *R: A language and environment for statistical computing*. http://www.R-project.org/.

34. Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*(2), 1–36.

35. Schumacker, R. E., & Lomax, R. G. (2010). *A beginner's guide to structural equation modeling* (3rd ed.). New York: Routledge Academic.

36. Weston, R., Gore, P. A, Jr, Chan, F., & Catalano, D. (2008). An introduction to using structural equation models in rehabilitation psychology. *Rehabilitation Psychology, 53*(3), 340–356.

37. Kapsou, M., Panayiotou, G., Kokkinos, C. M., & Demetriou, A. G. (2010). Dimensionality of coping: An empirical contribution to the construct validation of the Brief-COPE with a Greek-speaking sample. *Journal of Health Psychology, 15*(2), 215–229.

38. Sica, C., Magni, C., Ghisi, M., Altoè, G., Sighinolfi, C., Chiri, L. R., et al. (2008). Coping Orientation to Problems Experienced-Nuova Versione Italiana (COPE-NVI): uno strumento per la misura degli stili di coping. *Psicoterapia Cognitiva e Comportamentale, 14*(1), 27–53.

39. Revelle, W. (2012). *psych: Procedures for psychological, psychometric and personality research*. http://personality-project.org/r/psych.manual.pdf.

40. Coffman, D. L., & MacCallum, R. C. (2005). Using parcels to convert path analysis models into latent variable models. *Multivariate Behavioral Research, 40*(2), 235–259.

41. Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling, 8*(3), 430–457.

42. Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55.

43. MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130–149.

44. Pornprasertmanit, S., Miller, P., & Schoemann, A. (2013). *R package simsem: SIMulated structural equation modeling (version 0.5-3)*. http://cran.r-project.org/package=simsem.

45. Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155–159.

46. Hampton, N. Z. (2008). The affective aspect of subjective well-being among Chinese people with and without spinal cord injuries. *Disability and Rehabilitation, 30*(19), 1473–1479.

47. Hampton, N. Z. (2004). Subjective well-being among people with spinal cord injuries: The role of self-efficacy, perceived social support, and perceived health. *Rehabilitation Counseling Bulletin, 48*(1), 31–37.

48. Hampton, N. Z. (2000). Self-efficacy and quality of life in people with spinal cord injuries in China. *Rehabilitation Counseling Bulletin, 43*(2), 66–74.

49. Kennedy, P., Lowe, R., Grey, N., & Short, E. (1995). Traumatic spinal cord injury and psychological impact: A cross-sectional analysis of coping strategies. *British Journal of Clinical Psychology, 34*(Pt 4), 627–639.

50. Thompson, N. J., Coker, J., Krause, J. S., & Henry, E. (2003). Purpose in life as a mediator of adjustment after spinal cord injury. *Rehabilitation Psychology, 48*, 100–108.

51. Hampton, N. Z., & Marshall, A. (2000). Culture, gender, self-efficacy, and life satisfaction: A comparison between Americans and Chinese people with spinal cord injuries. *Journal of Rehabilitation, 66*(3), 21–28.

52. Galvin, L. R., & Godfrey, H. P. (2001). 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, 39*(12), 615–627.

53. Livneh, H., & Martz, E. (2012). Adjustment to chronic illness and disability: Theoretical perspectives, empirical findings, and unresolved issues. In P. Kennedy (Ed.), *The Oxford Handbook of Rehabilitation Psychology*. New York: Oxford University Press.

54. Bonanno, G. A., Pat-Horenczyk, R., & Noll, J. (2011). Coping flexibility and trauma: The perceived ability to cope with trauma (PACT) scale. *Psychological Trauma: Theory, Research, Practice, and Policy, 3*(2), 117–129.

55. Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense model of illness danger. In S. Rachman (Ed.), *Medical psychology* (Vol. 2, pp. 7–30). New York: Pergamon.

56. Maes, S., Leventhal, H., & De Ridder, D. T. D. (1996). Coping with chronic diseases. In M. Zeidner & N. S. Endler (Eds.), *Handbook of coping: Theory, research, applications* (pp. 221–251). Oxford: Wiley.

57. Anderson, C. J., Vogel, L. C., Chlan, K. M., & Betz, R. R. (2008). Coping with spinal cord injury: Strategies used by adults who sustained their injuries as children or adolescents. *Journal of Spinal Cord Medicine, 31*(3), 290–296.

58. McCreaddie, M., & Wiggins, S. (2008). The purpose and function of humour in health, health care and nursing: A narrative review. *Journal of Advanced Nursing, 61*(6), 584–595.

59. Proyer, R. T., Ruch, W., & Buschor, C. (2013). Testing strengths-based interventions: A preliminary study on the effectiveness of a program targeting curiosity, gratitude, hope, humor, and zest for enhancing life satisfaction. *Journal of Happiness Studies, 14*(1), 275–292.

60. de Vries, M. J., Schilder, J. N., Mulder, C. L., Vrancken, A. M., Remie, M., & Garssen, B. (1997). Phase II study of psycho-therapeutic intervention in advanced cancer. *Psychooncology, 6*(2), 129–137.

61. Vaughan, S. M., & Kinnier, R. T. (1996). Psychological effects of a life review intervention for persons with HIV disease. *Journal of Counseling & Development, 75*(2), 115–123.

62. Ruiz, F. J. (2010). A review of acceptance and commitment therapy (ACT) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology & Psychological Therapy, 10*(1), 125–162.

63. Ruiz, F. J. (2012). Acceptance and commitment therapy versus traditional cognitive behavioral therapy: A systematic review and meta-analysis of current empirical evidence. *International Journal of Psychology & Psychological Therapy, 12*(3), 333–357.

64. Sharp, K. (2012). A review of acceptance and commitment therapy with anxiety disorders. *International Journal of Psychology & Psychological Therapy, 12*(3), 359–372.

65. Zahl, M. L., Compton, D. M., Kim, K., & Rosenbluth, J. P. (2008). SCI/D forum to increase active living: The effect of a self-efficacy and self-affirmation based SCI/D forum on active living in adults with spinal cord injury/disease. *SCI Psychosocial Process, 21*(2), 5–13.

66. Rose, A., Piatt, J. A., Zahl, M., & Kim, K. (2008). The effect of a self-efficacy based forum on life satisfaction for individuals with spinal cord injury or disease. *Annual in Therapeutic Recreation, 16*, 49–56.

67. Perry, K. N., Nicholas, M. K., & Middleton, J. W. (2010). Comparison of a pain management program with usual care in a pain management center for people with spinal cord injury-related chronic pain. *Clinical Journal of Pain, 26*(3), 206–216.

68. Kennedy, P., Duff, J., Evans, M., & Beedie, A. (2003). Coping effectiveness training reduces depression and anxiety following traumatic spinal cord injuries. *British Journal of Clinical Psychology, 42*(Pt 1), 41–52.