

ORIGINAL ARTICLE

Social Skills: A Resource for More Social Support, Lower Depression Levels, Higher Quality of Life, and Participation in Individuals With Spinal Cord Injury?



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Abstract

Objective: To examine the relevance of social skills and their different dimensions (ie, expressivity, sensitivity, control) in relation to social support, depression, participation, and quality of life (QOL) in individuals with spinal cord injury (SCI).

Design: Cross-sectional data collection within the Swiss Spinal Cord Injury Cohort.

Setting: Community-based.

Participants: Individuals with SCI (N=503).

Interventions: Not applicable.

Main Outcome Measures: Depression, participation, and QOL were measured using the Hospital Anxiety and Depression Scale, the Utrecht Scale for Evaluation of Rehabilitation-Participation, and 5 selected items of the World Health Organization Quality of Life Scale. The Social Skills Inventory and the Social Support Questionnaire were used to assess social skills (expressivity, sensitivity, control) and social support, respectively.

Results: Structural equation modeling was conducted. In model 1 ($\chi^2=27.81$; $df=19$; $P=.087$; root mean square error of approximation=.033; 90% confidence interval=.000-.052), social skills as a latent variable was related to social support ($\beta=.31$; $R^2=.10$), depression ($\beta=-.31$; total $R^2=.42$), and QOL ($\beta=.46$; $R^2=.25$). Social support partially mediated the effect of social skills on QOL (indirect effect: $\beta=.04$; $P=.02$) but not on depression or participation. In model 2 ($\chi^2=27.96$; $df=19$; $P=.084$; root mean square error of approximation=.031; 90% confidence interval=.000-.053), the social skills dimension expressivity showed a path coefficient of $\beta=.20$ to social support and $\beta=.18$ to QOL. Sensitivity showed a negative path coefficient to QOL ($\beta=-.15$) and control a path coefficient of $\beta=-.15$ to depression and $\beta=.24$ to QOL.

Conclusions: Social skills are a resource related to more social support, lower depression scores, and higher QOL.

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Along with physical impairments, spinal cord injury (SCI) can be associated with an increased risk for psychological morbidity,¹⁻³ restricted participation in social life,^{4,5} and lower quality of life

(QOL).^{6,7} Social support can act as an important resource to address these challenges.⁸

Social support is defined as an exchange of resources between individuals intended to enhance the well-being of the recipient.⁹ It acts as a buffer to protect people against the negative effects of stress.¹⁰ Different types (ie, instrumental, informational, emotional) of social support from different sources (eg, family and

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friends) and perspectives (ie, quantity and quality) can be distinguished.¹¹⁻¹⁴ A systematic literature review in SCI shows that social support is related to better physical health (eg, lower frequency of urinary tract infections or pressure ulcers) and mental health (eg, lower symptoms of depression or anxiety), lower pain, effective coping, better adjustment to disability, and higher life satisfaction and QOL.¹⁵

According to the behavioral theory by Libet and Lewinsohn, the possession and demonstration of good social skills should bring about positive social consequences.¹⁶ In other words, people can use their social skills (internal resource) to seek social support (external resource). Social skills are defined as the ability to interact with other people in a way that is both appropriate and effective.¹⁷ This includes skills in encoding (ie, expressivity) and decoding (ie, sensitivity) information in social situations and the regulation of emotion and control of social situations (ie, control) in nonverbal and verbal ways. Expressivity means to accurately express felt emotional states and the ability to engage others in social interaction. Sensitivity refers to being empathic and to understanding the norms governing appropriate social behavior. Control skills relate to social adeptness and tact and include the appropriate regulation of emotional expressions, skills in social role-playing, and social self-presentation.¹⁸ In SCI, better social skills (ie, social problem-solving skills) are found to be related to lower symptoms of depression and lower frequency of urinary tract infections.¹⁵

Studies in the general population confirm that social skills positively correlate with perceived social support.¹⁹⁻²² Other studies show that social support mediates the relation between social skills and depression,²² psychological well-being,²¹ and life satisfaction.²⁰ However, research about the relation between social skills and social support in SCI is limited.¹⁵ One study in SCI indicates that individuals with higher social skills (ie, assertiveness) are more depressed under the condition of higher informational support.²³ Studies on social skills and social support could provide information about the potential usefulness of strengthening these resources as part of the rehabilitation program and community services, with the goal to enhance mental health, the level of participation, and QOL of individuals living with SCI.

The objective of this study was to examine the relevance of social skills and their different dimensions (ie, expressivity, sensitivity, and control) in relation to social support, depression, participation, and QOL in individuals with SCI. The specific aims were (1) to test the following hypotheses: (a) higher levels of social skills relate to higher levels of social support and (b) the relation between social skills and depression, participation, and QOL is mediated by social support, and (2) to explore the specific social skill dimensions expressivity, sensitivity, and control in how they relate to social support, depression, participation, and QOL.

List of abbreviations:

HADS-D	depression subscale of the Hospital Anxiety and Depression Scale
QOL	quality of life
RMSEA	root mean square error of approximation
SCI	spinal cord injury
SSI	Social Skills Inventory
SwiSCI	Swiss Spinal Cord Injury Cohort Study

Methods

Design

A cross-sectional observational study, nested in the Swiss Spinal Cord Injury Cohort Study (SwiSCI), was conducted. The SwiSCI is a prospective cohort study that aims to contribute to a comprehensive understanding of the lived experience of individuals with SCI living in Switzerland. It consists of 3 data collection pathways: (1) a retrospective data collection based on existing medical records of specialized SCI rehabilitation centers; (2) a community survey of individuals living with SCI; and (3) an inception cohort study of newly injured persons. The present study is embedded in pathway 2. The design of the SwiSCI is reported in more detail elsewhere.²⁴

Participants

The SwiSCI includes individuals 16 years or older with permanent residence in Switzerland and with traumatic or nontraumatic SCI. Persons with congenital conditions including spina bifida, new SCI in the context of palliative (end-of-life) care, neurodegenerative disorders including multiple sclerosis and amyotrophic lateral sclerosis, and Guillain-Barré syndrome were excluded.

Medical records of 4 SCI rehabilitation centers in Switzerland and member lists of SCI associations were screened for eligible participants. All participants signed an informed consent form. The SwiSCI adheres to applicable national and international standards for research in humans and was approved by ethical committees.

Procedures

Study participants completed self-report questionnaires sent by postal mail (an online survey option was available). First, information about the SwiSCI, an informed consent form, and a brief questionnaire about sociodemographic and lesion-related characteristics were sent to the eligible participants. Persons who returned the first questionnaire and agreed to participate in the SwiSCI were eligible for further participation. They were sent a second questionnaire on health problems, functioning, and well-being. To reduce burden for participants, respondents of the second questionnaire were randomly assigned to 1 of 3 modules (ie, [1] health services module, [2] work and employment module, and [3] health behavior and personal factors module) for a third questionnaire. Thereby, 38% of the respondents were randomly assigned to the present study (ie, health behavior and personal factors module). A slightly higher percentage than one third was allocated to the present study to ensure a large enough sample to adequately test the study hypotheses. Randomization was done controlling for sex, age, and level of injury (paraplegia vs tetraplegia).

Instruments

Social skills

The short form of the Social Skills Inventory (SSI)¹⁸ was applied to measure social skills. The SSI consists of an expressivity (social skills expressivity), sensitivity (social skills sensitivity), and control (social skills control) subscale (30 items in total). The SSI has shown good content validity and acceptable internal consistency in the general population.¹⁸ In the present study, internal consistency

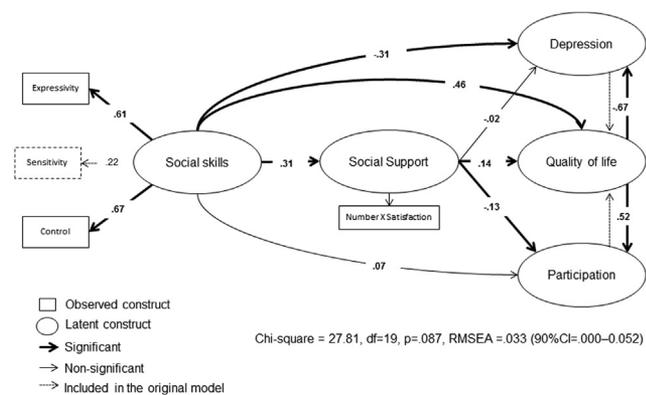


Fig 1 Structural equation model 1: relations between social skills, social support, and depression, participation, and QOL. Square indicates observed construct; oval, latent construct; bold line, significant path; fine line, nonsignificant path; dotted line, path included in the original model. Abbreviation: CI, confidence interval.

of the SSI was acceptable (Cronbach alpha of SSI total score = .80; social skills expressivity = .73; social skills sensitivity = .71; social skills control = .70).

Social support

The Short Form Social Support Questionnaire¹⁴ includes 6 items and measures the number of social support providers and satisfaction with social support. Social Support Questionnaire scores have shown high test-retest reliability, high internal consistency, and confirmed construct validity in the general population¹⁴ and are frequently used in SCI.¹⁵

Depression

The 7 items of the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D)²⁵ were used as a measure of depression. The HADS-D has been found to be reliable and valid in assessing the symptom severity of depression in somatic, psychiatric, primary care, and general populations. It has been evaluated as psychometrically robust in a SCI population.²⁶ In this study, Cronbach alpha was good (.84).

Participation

Participation was measured with the Restrictions subscale of the Utrecht Scale for Evaluation of Rehabilitation-Participation.²⁷ The 11 items measure participation restrictions experienced in vocational, leisure, and social activities as a result of the person’s health or disability. Higher scores on this measure indicate less restriction or more participation. The Utrecht Scale for Evaluation of Rehabilitation-Participation has shown satisfactory validity, test-retest reliability, and responsiveness in rehabilitation settings.²⁷⁻²⁹ Cronbach alpha in this study was good (.85).

Quality of life

Five selected items of the World Health Organization Quality of Life Scale were used to assess QOL.^{30,31} They cover overall QOL, satisfaction with health, daily activities, relations, and living conditions. Psychometric properties in a SCI population were satisfactory³¹; in this study, Cronbach alpha was acceptable (.80).

Multiple language versions of the above-listed questionnaires (ie, German, French, and Italian) were used.

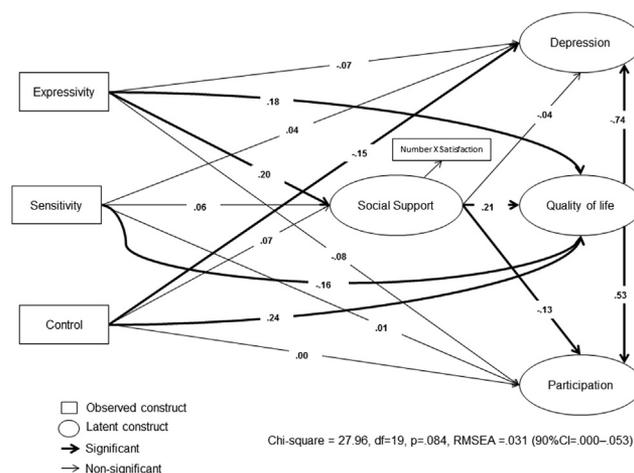


Fig 2 Structural equation model 2: relations between social skill dimensions (expressivity, sensitivity, and control), social support, and depression, participation, and QOL. Square indicates observed construct; oval, latent construct; bold line, significant path; fine line, nonsignificant path; dotted line, path included in the original model. Abbreviation: CI, confidence interval.

Structural equation modeling

To address the study aims, structural equation modeling was performed using the free statistics environment “R” (version 3.0.1)^a and its “lavaan” package.³²

Structural equation modeling combines 2 statistical techniques: factor analysis and path analysis. In factor analysis, unobserved latent constructs are inferred from intercorrelations among measured variables (measurement model, eg, for social skills). The path analysis depicts the relations among the latent constructs (structural model, eg, relation between social skills and social support).³³

Full information maximum likelihood estimation was used.³⁴ To account for nonnormal distribution of data, bootstrapping SEs (1000 draws) and Yuan-Bentler scaled chi-square tests were requested.³⁵

To test the study hypotheses, 2 models were specified: model 1 (fig 1) incorporates total social skills as a latent variable and estimates its relation to social support and the outcomes depression, participation, and QOL; model 2 (fig 2) includes the 3 dimensions (expressivity, sensitivity, and control) of the social skills construct separately as observed variables and estimates their relations to social support and the outcomes depression, participation, and QOL. For both models, total social support was measured by the product of the number of social support providers and the satisfaction with social support. Participation, depression, and QOL were measured by item parcels. These are sum scores of subsets of a scale’s items that incorporate measurement errors into the model to reduce bias of the parameter estimates.³⁶ We constructed homogeneous and/or domain representative item parcels.³⁶ Considering participation, the first participation parcel consisted of 5 items from the Restriction subscale of the Utrecht Scale for Evaluation of Rehabilitation-Participation questionnaire asking about restriction in work, household, mobility, physical activity, and going out. The second participation parcel included 6 items from the same questionnaire asking about restriction in leisure activities and social interaction with intimate partner, family, and

friends. For depression, the first depression parcel included 3 items from the HADS-D asking about enjoying things like in the past, seeing the funny side of life, and being cheerful. The second depression parcel included 4 items from the HADS-D that ask about the extent of feeling slowed down, having lost interest in one's appearance, and being optimistic and enjoying things in the present. For QOL, the World Health Organization Quality of Life Scale item measuring the overall QOL constituted one item parcel and the 4 specific World Health Organization Quality of Life Scale items asking about satisfaction in specific life domains constituted the other parcel.

The model fit was determined according to the chi-square test. A nonsignificant chi-square value ($P > .05$) indicates that the hypothesized model does not deviate significantly from the empirically observed relations in the data. In addition, the root mean square error of approximation (RMSEA), which takes sample size and model complexity into account, was used to assess model fit. An RMSEA value of $< .06$ (90% confidence interval) was taken as indication of good model fit.³⁷ As incremental measures of fit (relative to the independence model), comparative fit index and Tucker-Lewis Index (also called Non-Normed Fit Index) were used, with values $> .95$ commonly regarded as indicating good fit.^{37,38} Standardized root mean square residual assesses the average discrepancy between empirical and model-implied covariances, with values close to 0 indicating good fit. Standardized path coefficients (β) were obtained. Values greater than .50 indicate a large effect, values around .30 a medium effect, and values around .10 a small effect.³⁹ Model modification was considered on the basis of examination of standardized residuals > 2 , which indicate differences between model and data. Mediation was assessed by testing the significance of indirect effects, which are effects of social skills via social support on the outcomes depression, participation, and QOL.

Models 1 and 2 were evaluated regarding the power to detect model misspecification in terms of the RMSEA⁴⁰ and the power to test parameters, such as path coefficients, by means of a post hoc Monte Carlo power analysis applying the R package *simsem*.⁴¹

Results

Response rate was 61.4% ($n=3021$) to the first questionnaire, 82.6% ($n=1532$) to the second questionnaire, and 86.9% ($n=506$) to the third questionnaire of the present study. Three persons did not fill in all the questionnaires; hence, their data were not included in the analyses (final $n=503$). Table 1 shows that participants were mainly men, had a mean age of 55 years, and had on average been living 19 years with paraplegia (66%) or tetraplegia (31%). Table 2 lists the mean, the score range, and the number of missing values for each measurement instrument. Total social skills correlated with total social support ($r=.27$), lower depression ($r=-.38$), less participation restriction ($r=.14$), and greater QOL ($r=.24$) (table 3). Total social support correlated with lower depression ($r=-.29$) and greater QOL ($r=.26$).

Specific aim 1 of the study is addressed in model 1 (see fig 1), which depicts the relations between total social skills as a latent variable, social support as a possible mediating variable, and the outcomes depression, participation, and QOL. The measurement model of total social skills in model 1 did not fit and was changed, on the basis of nonsignificant path coefficient, by removing sensitivity. In addition, the paths from depression and participation to QOL were reversed on the basis of examination of standardized residuals. After this modification, the model fitted with a

Table 1 Descriptive characteristics of study participants (N=503)

Characteristic	Value
Sex	
Male	361 (71.8)
Female	140 (27.8)
Missing	2 (0.4)
Marital status	
Single (never married)	155 (30.8)
Married	250 (49.7)
Widowed	69 (13.7)
Divorced	22 (4.4)
Registered partnership	2 (0.4)
Missing	5 (1.0)
Age (y), mean (range)	54.57 (19–92)
Missing	2 (0.4)
Education (y), mean (range)	13.8 (2–25)
Missing	11 (2.2)
Time since injury (y), mean (range)	19 (1.3–62.3)
Missing	12 (3.6)
Level of lesion	
Paraplegia	332 (66.0)
Tetraplegia	154 (30.6)
Missing	17 (3.4)
Completeness of lesion	
Complete	221 (44.0)
Incomplete	274 (54.5)
Missing	8 (1.5)
Cause of injury	
Traumatic	391 (77.7)
Nontraumatic	80 (15.9)
Unspecified	28 (5.6)
Missing	4 (0.8)

NOTE. Values are n (%) or as otherwise indicated.

nonsignificant chi-square value of 27.81 ($df=19$; $P=0.87$) and an RMSEA value of .030 (90% confidence interval=.000–.052; comparative fit index=.994; Tucker-Lewis Index=.989; standardized root mean square residual=.021).

With regard to hypothesis 1a, a standardized path coefficient of .31 between social skills as a latent variable and social support was found in model 1 ($P<.001$). Social skills explained 10% of the variance in social support.

Testing hypothesis 1b showed that total social support only partially mediated the relation between social skills and QOL (indirect effect: $\beta=.04$; $P=.02$). However, social support did not mediate the relation between social skills and depression (indirect effect: $\beta=-.01$; $P=.59$) and social skills and participation (indirect effect: $\beta=-.04$; $P=.06$).

Also, a direct association of social skills with QOL was apparent ($\beta=.46$; $P<.001$) and social skills as a latent variable was found to be directly related to depression ($\beta=-.31$; $P<.001$). However, the direct association of social skills with participation was not significant ($\beta=.07$).

The path coefficients from social support to QOL ($\beta=.14$; $P=.02$) as well as to participation ($\beta=-.13$; $P=.03$) were significant. A nonsignificant path coefficient from social support to depression was found ($\beta=-.02$). Together, all predictors in the model explained 42% of the variance in depression, 25% of the

Table 2 Descriptive characteristics of social skills, social support, and the outcomes depression, participation, and QOL

Variable	Measure	Range	Mean \pm SD	Missing, n (%) [*]
Social skills (total score)	SSI	59–134	92.65 \pm 11.88	46 (9.1)
Expressivity	SSI	11–50	30.54 \pm 5.87	25 (5.0)
Emotional expressivity	SSI	6–25	15.95 \pm 2.81	22 (4.4)
Social expressivity	SSI	5–25	14.62 \pm 4.39	16 (3.2)
Sensitivity	SSI	10–46	28.65 \pm 5.49	30 (6.0)
Emotional sensitivity	SSI	5–25	15.23 \pm 3.57	25 (5.0)
Social sensitivity	SSI	5–25	13.44 \pm 3.67	18 (3.6)
Control	SSI	15–48	33.61 \pm 5.33	26 (5.2)
Emotional control	SSI	6–25	16.76 \pm 3.17	20 (4.0)
Social control	SSI	6–25	16.87 \pm 3.45	18 (3.6)
Social support (total) [†]	SSQ		594.61 \pm 388.05 [‡]	NA
Number of support persons (SSQN)	SSQ	0–54	17.58 \pm 17.48 [‡]	45 (8.9)
Satisfaction with support (SSQS)	SSQ	6–36	31.84 \pm 5.70	93 (18.5)
Depression	HADS-D	0–20	4.54 \pm 3.87	10 (2.0)
Participation	USER-P	0–100	70.01 \pm 21.58	2 (0.4)
QOL	WHOQOL-BREF	5–25	18.84 \pm 3.45	27 (5.4)

Abbreviations: NA, not applicable; SSQ, Social Support Questionnaire; SSQN, number of social support providers; SSQS, satisfaction with social support; USER-P, Restrictions subscale of the Utrecht Scale for Evaluation of Rehabilitation-Participation; WHOQOL-BREF, five selected items of the World Health Organization Quality of Life Scale.

^{*} Values are n (%). Missing n total score; that is, if there is 1 item missing, the total score could not be calculated and is therefore missing. Little's Missing Completely at Random test (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).

[†] Total score of the SSQ refers to the product of social support number and social support satisfaction.

[‡] Three (2–4) support persons per participant and question.

variance in QOL, and 8% of the variance in participation. Model 2 (see fig 2) addresses specific aim 2 and includes the social skill domains expressivity, sensitivity, and control and their relation to social support (possible mediator) and depression, participation, and QOL.

The second model fits well, with a nonsignificant chi-square value of 27.96 ($df = 19$; $P = .084$) and an RMSEA value of .031 (90% confidence interval = .000–.053; comparative fit index = .994; Tucker-Lewis Index = .987; standardized root mean square residual = .017).

In model 2, expressivity was related to social support ($\beta = .20$; $P < .001$). The path coefficients from sensitivity ($\beta = .06$) and control ($\beta = .07$) to social support were not significant.

The social skills dimension control was inversely related to depression ($\beta = -.15$; $P < .001$). Control ($\beta = .24$; $P < .001$) as well as expressivity ($\beta = .18$; $P < .001$) were directly related to QOL. Sensitivity was inversely related to QOL ($\beta = -.16$; $P = .002$).

Social support partially mediated only the relation between the social skills dimension expressivity and QOL (indirect effect: $\beta = .04$; $P = .01$).

The power to detect model misspecification in terms of the RMSEA was good, varying between .82 and .87 for both models. For all path coefficients that turned out significant, the average power to detect nonzero parameters was .721 in model 1 and .744 in model 2.

Discussion

This study examined the relevance of social skills and their different dimensions (ie, expressivity, sensitivity, and control) in relation to social support, depression, participation, and QOL in individuals with SCI. The findings indicate that social skills can

be seen as a resource for individuals with SCI, being related to more social support, less depressive symptoms, and higher QOL. More specifically, being expressive in social situations can be linked to more social support and higher levels of QOL and being in control over situations can be associated with lower levels of depressive symptoms. In contrast, being sensitive in social situations seems to be negatively related to QOL. The association of social skills with QOL was found to be partially mediated by social support.

A medium association between total social skills and social support was found, which supports hypothesis 1a that higher levels of social skills relate to more social support. This finding is supported by research in the general population.^{19–22} However, in this study, only the subscale expressivity was significantly related to social support and total social skills explained only a small amount of variance in social support. For individuals with SCI, receiving social support could depend on other factors that have not been assessed in this study, for example, secure attachments formed in childhood as a basis of an adult's ability to form socially supportive relations.⁴²

Hypothesis 1b was partly supported by the study findings. Social support partially mediated the relation between social skills on the one hand and QOL on the other hand, which is consistent with findings from the general population.^{21,43} However, social support did not mediate the relation between social skills and depression. Instead, medium direct associations between social skills and depression were found. This finding is consistent with studies supporting the behavioral theories of depression, which specify social skills deficits as a risk factor for depression²² and possessing adequate social skills as a protective factor against psychological morbidity.⁴⁴ In this study, especially, adequate emotional regulation (being in control) as a specific social skill

Table 3 Pearson correlation between social skills (expressivity, sensitivity, and control), social support, depression, participation, and QOL

Variable	SSIE	SSIS	SSIC	Total SSk	SSQN	SSQS	Total SSUp	HADS	USER-P	WHOQOL
Social skills										
Expressivity (SSIE)										
Sensitivity (SSIS)	.26*									
Control (SSIC)	.41*	.08 [†]								
Social skills (total SSk)	.80*	.63*	.69*							
Social support										
Number (SSQN)	.26*	.15*	.16*	.28*						
Satisfaction (SSQS)	.08	.01	.13 [†]	.10 [†]	.29*					
Social support (total SSUp)	.26*	.13 [†]	.16*	.27*	.97*	.47*				
Outcomes										
Depression (HADS)	-.36*	-.02	-.41*	-.38*	-.25*	-.27*	-.29*			
Participation (USER-P)	.18*	-.03	.16*	.14*	.07	.00	.04	-.32*		
QOL (WHOQOL)	.27*	-.09 [†]	.34*	.24*	.22*	.29*	.26*	-.68*	.44*	
Sex	-.02	.14*	-.08	.03	.12 [†]	.11 [†]	.12 [†]	-.01	-.09	.00
Age	-.16*	-.07	-.13*	-.16*	-.17*	-.02	-.14*	.15*	-.17*	-.07
Education (y)	.08	.09	.16*	.16*	.13*	.03	.13*	-.04	.10*	.04
Time since injury (mo)	.07	.00	.13*	.10 [†]	-.02	.03	.02	-.20*	-.02	.19*

NOTE. Sum scores of the scales/subscales were used to compute correlations.

Abbreviations: HADS, Hospital Anxiety and Depression Scale; SSIC, social skills control; SSIE, social skills expressivity; SSIS, social skills sensitivity; SSk, social skills; SSQ, Social Support Questionnaire; SSQN, number of social support providers; SSQS, satisfaction with social support; SSUp, social support; USER-P, Restrictions subscale of the Utrecht Scale for Evaluation of Rehabilitation-Participation; WHOQOL-BREF, five selected items of the World Health Organization Quality of Life Scale.

* Correlation is significant at the .01 level.

[†] Correlation is significant at the .05 level.

dimension was found to be important in relation to lower levels of depressive symptoms.

Total social skills showed, in addition to a mediated relation via social support, a medium direct relation to QOL, which is in line with findings from the general population.^{21,43} High levels of social skills are linked to active interaction and frequently investing in social relations. Positive experiences with these social relations provide a sense of satisfaction with social relationships and contribute to QOL.^{21,45,46} Skills in expressivity, in specific, might contribute to the achievement of interpersonal goals and winning the praise and admiration of others. However, the present findings also showed that being sensitive in social situations seems to be negatively related to QOL in persons with SCI. Persons with a disability and high scores in sensitivity might more likely detect negative signals, for example, in relation with negative attitudes, prejudice, and discrimination against individuals with disabilities, in specific in cases of little social support.

Social skills are not directly related to participation, which is surprising because some associations were expected to at least affect participation in social activities. However, questions assessing participation restrictions ask about the extent to which the SCI limits daily life. SCI in in this sense might “overrule” the effectiveness and appropriateness of social interactions.

Social support showed a small association with QOL, a small negative association with participation, and no association with depression. In patients with SCI, lower life satisfaction has been found to be related to higher instrumental and informational support, higher emotion-oriented support from friends, and lower emotion-oriented support from family.⁴⁷ Another study showed that instrumental support and positive social interaction support predicted satisfaction with participation, whereas informational, emotional, and affectionate support did not.⁴⁸ In addition, individuals who have fewer relations in which other persons

provided more help were more likely to be mobile, productive, and interested in leisure activities.⁴⁹ Findings about the relation between social support and depression are inconsistent with studies that link depression with a lack of social support, and others indicate that social support implies a source of stress and deteriorates mental health.⁵⁰ In other words, the different dimensions of social support (ie, type and source) seem to have different effects on a person’s QOL, participation restrictions, and depressive symptoms. Future studies are necessary to disentangle the effects of social support dimensions on well-being outcomes.

Finally, testing the model revealed an association of QOL with depression and participation. Research found reciprocal relations between these outcomes, indicating that individuals with high levels of depressive symptoms perceived their QOL as poor⁵¹ and also that poor QOL (low satisfaction with health, daily activities, relationships, or living conditions) can lead to an elevated risk of developing depressive symptoms.⁵² With regard to participation, low QOL (low satisfaction with health, daily activities, or living conditions) is linked to inactivity and low levels of participation⁵³ but low levels of participation (restrictions in vocational, leisure, and social activities) can also be linked to lower QOL.⁵⁴ Longitudinal studies can clarify the causal relation between these outcomes. For example, a recent longitudinal study suggests that depression predicts QOL in individuals with SCI.⁵⁵

Study limitations

Conclusions about causality in cross-sectional studies cannot be drawn. Longitudinal data are needed to approach causality. Interpretation of the present findings is constrained by self-report measurements because they yield incomplete measures. Social

skills, for example, can also be assessed through behavioral assessment. The findings are based on a self-selected community sample of a Swiss population of individuals with SCI and are not necessarily generalizable to the entire SCI population. Finally, our structural equation modeling approach was to some extent data-driven and exploratory, and so the models need to be cross-validated to enhance the generalizability of the results. In particular, our model fit was significant only after modification indices were applied, which may not be theoretically or conceptually consistent with the broader body of research on QOL. Given the limitations of our cross-sectional study design, additional research is needed to test and confirm the directionality of these relations.

Clinical implications

This study suggests that strengthening social skills and fostering interactions with social relations can support individuals with SCI to enhance their QOL and reduce depressive symptoms. Social skills training can be offered by psychologists at the rehabilitation centers. It aims at a realistic preparation of the patient to a life after discharge. Goals of these trainings are not only to increase the capacity to act, to expand the use of social skills, and to decrease feelings of helplessness in social situations, which are more difficult or at least changed because of SCI, but also to strengthen the belief in one's own social skills, which would prevent the patient from self-depreciation and withdrawal.⁵⁶ According to the findings of this study, such social skills training may focus on being expressive and having emotional control in social situations. Training in expressivity could include learning to be "effective," which means to be able to inform others about one's emotional state and personal needs (eg, to ask for help). Training in control may focus on the "appropriateness," which implies learning to regulate emotions, to promote skills in self-presentation and adjustment to certain social situations (eg, to approach people who are not familiar with SCI).

Social skills training has shown its effectiveness in the general population,⁵⁷ with children and adolescents,⁵⁸ in relation to mental^{59,60} and physical health.⁶¹⁻⁶³ In SCI, 2 intervention trials with small sample sizes report on the effectiveness of social skills training.^{64,65} In addition, intervention studies in social skills have reported improvements in social support ratings.⁶⁶

Conclusions

This study showed that social skills are a resource related to more social support, lower depression scores, and higher QOL. Longitudinal studies are necessary to clarify causality and to better inform the development of effective social skills training for individuals with a physical disability.

Suppliers

a. R Core Team. Available at: <http://www.R-project.org/>.

Keywords

Depression; Quality of life; Rehabilitation; Social support; Spinal cord injuries

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References

1. Sakakibara BM, Miller WC, Orenczuk SG, Wolfe DL. A systematic review of depression and anxiety measures used with individuals with spinal cord injury. *Spinal Cord* 2009;47:841-51.
2. 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* 2001;39:615-27.
3. Bombardier CH, Richards JS, Krause JS, Tulsy D, Tate DG. Symptoms of major depression in people with spinal cord injury: implications for screening. *Arch Phys Med Rehabil* 2004;85:1749-56.
4. Carpenter C, Forwell SJ, Jongbloed LE, Backman CL. Community participation after spinal cord injury. *Arch Phys Med Rehabil* 2007;88:427-33.
5. Schonherr MC, Groothoff JW, Mulder GA, Eisma WH. Participation and satisfaction after spinal cord injury: results of a vocational and leisure outcome study. *Spinal Cord* 2005;43:241-8.
6. Dijkers MP. Quality of life of individuals with spinal cord injury: a review of conceptualization, measurement, and research findings. *J Rehabil Res Dev* 2005;42:87-110.
7. Post M, Noreau L. Quality of life after spinal cord injury. *J Neuro Phys Ther* 2005;29:139-46.
8. Uchino BN, Bowen K, Carlisle M, Birmingham W. Psychological pathways linking social support to health outcomes: a visit with the "ghosts" of research past, present, and future. *Soc Sci Med* 2012;74:949-57.
9. Shumaker S, Brownell IA. Toward a theory of social support: closing conceptual gaps. *J Soc Issues* 1984;40:11-36.
10. Cohen S, Wills T. Stress, social support, and the buffering hypothesis. *Psychol Bull* 1985;98:310-57.
11. Antonucci T. Personal characteristics, social support, and social behavior. In: Binstock R, Shanas A, editors. *Handbook of aging and the social sciences*. New York: Van Nostrand-Reinhold; 1985. p 94-128.
12. House J, Kahn RL. Measures and concepts of social support. In: Cohen J, Syme SL, editors. *Social support and health*. New York: Academic Pr; 1985. p 83-108.

13. Kahn R, Antonucci TC. Convoys over lifecourse: attachment, roles and social support. In: Baltes P, Brim O, editors. *Life-span development and behavior*. New York: Academic Pr; 1980. p 253-86.
14. Sarason I, Sarason B, Shearing E, Pierce G. A brief measure of social support: practical and theoretical implications. *J Soc Pers Relat* 1987; 4:497-510.
15. 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.
16. Libet JM, Lewinsohn PM. Concept of social skill with special reference to the behavior of depressed persons. *J Consult Clin Psychol* 1973;40:304-12.
17. Segrin C. Specifying the nature of social skill deficits associated with depression. *Hum Commun Res* 1992;19:89-123.
18. Riggio R. The Social Skills Inventory (SSI): measuring nonverbal and social skills. In: Manusov V, editor. *The sourcebook of nonverbal measures: going beyond words*. Mahwah: Erlbaum; 2005.
19. Macdonald E, Jackson HJ, Hayes RL, Baglioni AJ Jr, Madden C. Social skill as a determinant of social networks and perceived social support in schizophrenia. *Schizophrenia Res* 1998;29:275-86.
20. Riggio R, Waring KP, Throckmorton B. Social skills, social support, and psychosocial adjustment. *Pers Individ Differ* 1993;15:275-80.
21. Segrin C, Taylor M. Positive interpersonal relationships mediate the association between social skills and psychological well-being. *Pers Individ Differ* 2007;43:637-46.
22. Segrin C, Rynes KN. The mediating role of positive relations with others in associations between depressive symptoms, social skills, and perceived stress. *J Res Pers* 2009;43:962-71.
23. Elliott T, Herrick SH, Patti AM, Witty TE, Godshall FJ, Spruell M. Assertiveness, social support, and psychological adjustment following spinal cord injury. *Behav Res Ther* 1991;29:485-93.
24. Post MW, Brinkhof MW, von Elm E, et al. Design of the Swiss Spinal Cord Injury Cohort Study. *Am J Phys Med Rehabil* 2011;90:S5-16.
25. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand* 1983;67:361-70.
26. Müller R, Cieza A, Geyh S. Rasch analysis of the Hospital Anxiety and Depression Scale in spinal cord injury. *Rehabil Psychol* 2012;57: 214-23.
27. Van der Zee C, Priesterbach AR, van der Dussen L, et al. Reproducibility of three self-report participation measures: the ICF Measure of Participation and Activities Screener, the Participation Scale, and the Utrecht Scale for Evaluation of Rehabilitation-Participation. *J Rehabil Med* 2010;42:752-7.
28. Post MW, van der Zee CH, Hennink J, Schafrat CG, Visser-Meily JM, van Berlekom SB. Validity of the Utrecht Scale for Evaluation of Rehabilitation-Participation. *Disabil Rehabil* 2012;34: 478-85.
29. van der Zee CH, Post MW, Brinkhof MW, Wagenaar RC. Comparison of the Utrecht Scale for Evaluation of Rehabilitation-Participation with the ICF Measure of Participation and Activities Screener and the WHO Disability Assessment Schedule II in persons with spinal cord injury. *Arch Phys Med Rehabil* 2014;95: 87-93.
30. WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychol Med* 1998;28: 551-8.
31. Geyh S, Fellinghauer BA, Kirchberger I, Post MW. Cross-cultural validity of four quality of life scales in persons with spinal cord injury. *Health Qual Life Outcomes* 2010;8:1-16.
32. Rosseel Y. lavaan: an R package for structural equation modeling. *J Stat Softw* 2012;48:1-36.
33. Jöreskog KG. A general method for estimating a linear structural equation system. In: Goldberger AS, Duncan OD, editors. *Structural equation models in the social sciences*. New York: Academic Pr; 1973.
34. Enders CK, Bandalos DL. The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Struct Equ Modeling* 2001;8:430-57.
35. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods* 2008;40:879-91.
36. Coffman DL, MacCallum RC. Using parcels to convert path analysis models into latent variable models. *Multivar Behav Res* 2005;40: 235-59.
37. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structl Equ Modeling* 1999;6:1-55.
38. Hu L, Bentler PM. Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. *Psychol Methods* 1998;3:424-53.
39. Cohen JA. power primer. *Psychol Bull* 1992;112:155-9.
40. MacCallum RC, Browne MW, Sugawara HM. Power analysis and determination of sample size for covariance structure modeling. *Psychol Methods* 1996;1:130-49.
41. Pornprasertmanit S, Miller P, Schoemann A. R package simsem: SIMulated structural equation modeling (version 0.5-3). 2013. Available at: <http://cran.r-project.org/package=simsem>. Accessed September, 2013.
42. Bowlby J. *Attachment*. London: Pelican; 1971.
43. Segrin C, Hanzal A, Donnerstein C, Taylor M, Domschke TJ. Social skills, psychological well-being, and the mediating role of perceived stress. *Anxiety Stress Coping* 2007;20:321-9.
44. Lewinsohn PM, Hoberman H, Teri L, Hautzinger M. An integrative theory of depression. In: Reiss S, Bootzin RR, editors. *Theoretical issues in behavior therapy*. New York: Academic Pr; 1985. p 331-59.
45. Ryff CD, Singer BH, Wing E, Love GD. Elective affinity and uninvited agonies: mapping emotion with significant others onto health. In: Ryff CD, Singer BH, editors. *Emotion, social relationships, and health*. New York: Oxford Univ Pr; 2001. p 133-75.
46. Segrin C. Interpersonal processes in psychological problems. Mahwah, NJ: Erlbaum; 2001.
47. Post MW, Ros W, Schrijvers A. Impact of social support on health status and life satisfaction in people with a spinal cord injury. *Psychol Health* 1999;14:679-95.
48. Hand C, Law M, McColl MA, Hanna S, Elliott S. An examination of social support influences on participation for older adults with chronic health conditions. *Disabil Rehabil* 2014;36:1439-44.
49. Rintala D, Young ME, Hart KA, Fuhrer MJ. The relationship between the extent of reciprocity with social supporters and measures of depressive symptomatology, impairment, disability, and handicap in persons with spinal cord injury. *Rehabil Psychol* 1994;39:15-27.
50. Vilhjalmsson R. Life stress, social support and clinical depression: a reanalysis of the literature. *Soc Sci Med* 1993;37:331-42.
51. Borsbo B, Peolsson M, Gerdl B. The complex interplay between pain intensity, depression, anxiety and catastrophising with respect to quality of life and disability. *Disabil Rehabil* 2009;31:1605-13.
52. Mausbach BT, Cardenas V, Goldman SR, Patterson TL. Symptoms of psychosis and depression in middle-aged and older adults with psychotic disorders: the role of activity satisfaction. *Aging Ment Health* 2007;11:339-45.
53. Ravenek KE, Ravenek MJ, Hitzig SL, Wolfe DL. Assessing quality of life in relation to physical activity participation in persons with spinal cord injury: a systematic review. *Disabil Health J* 2012;5: 213-23.
54. Van Leeuwen CM, Post MW, Westers P, et al. Relationships between activities, participation, personal factors, mental health, and life satisfaction in persons with spinal cord injury. *Arch Phys Med Rehabil* 2012;93:82-9.
55. Sweet SN, Martin Ginis KA, Tomasone JR. Investigating intermediary variables in the physical activity and quality of life relationship in persons with spinal cord injury. *Health Psychol* 2013;32:877-85.
56. Schöler L, Lindenmeyer J, Schöler H. *Das alles soll ich nicht mehr können?* Weinheim: Beltz Verlag; 1981.
57. Lopes P, Salovey P. Toward a broader education: social, emotional and practical skills. In: Zins J, Weissberg RP, Wang MC, Walberg HJ, editors. *Building academic success on social and emotional learning:*

- what does the research say? New York: Teachers College Pr; 2004. p 76-93.
58. Foster S, Bussman JR. Evidence-based approaches to social skills training with children and adolescents. In: Steele R, Elkin TD, Roberts MC, editors. *Handbook of evidence-based therapies for children and adolescents: bridging science and practice*. New York: Springer Science + Business Media; 2008. p 409-27.
 59. Kopelowicz A, Liberman RP, Zarate R. Recent advances in social skills training for schizophrenia. *Schizophrenia Bull* 2006;32:12-23.
 60. Tse W, Bond AJ. The impact of depression on social skills. *J Nerv Ment Dis* 2004;192:260-8.
 61. Liberman R, Kopelowicz A, Silverstein SM. Psychiatric rehabilitation. In: Sadock B, Sadock VA, editors. *Comprehensive textbook of psychiatry*. Baltimore: Lippincott Williams & Wilkins; 2005. p 3884-930.
 62. Hersen M, Bellack AS, Himmelhoch JM. Treatment of unipolar depression with social skills training. *Behav Modif* 1980;4:547-56.
 63. O'Malley S, Jaffe AJ, Chang G, Schottenfeld RS, Meyer RE, Rounsaville B. Naltrexone and coping skills therapy for alcohol dependence: a controlled study. *Arch Gen Psychiatry* 1992; 49:881.
 64. Dunn M, Van Horn E, Herman SH. Social skills and spinal cord injury: a comparison of three training procedures. *Behav Ther* 1989; 12:153-64.
 65. Glueckauf R, Quittner AL. Assertiveness training for disabled adults in wheelchairs: self-report, role-play, and activity pattern outcomes. *J Consult Clin Psych* 1992;60:419-25.
 66. Hogan B, Linden W, Najarian B. Social support intervention: do they work? *Clin Psychol Rev* 2002;22:383-442.