REVIEW

The role of social support and social skills in people with spinal cord injury—a systematic review of the literature

R Müller^{1,2}, C Peter^{1,2}, A Cieza^{1,2} and S Geyh^{1,3}

Study design: Systematic literature review.

Objectives: To examine the current knowledge of how social support and social skills are associated with aspects of health, functioning and quality of life of persons living with spinal cord injury (SCI).

Methods: A systematic literature review was conducted. The literature search was carried out in Pubmed, PsycINFO, ERIC (Educational Resources Information Centre), CINAHL (Cumulative Index to Nursing and Allied Health Literature), Embase and SSCI (Social Sciences Citation Index). Publications were identified according to predefined eligibility criteria; study qualities were evaluated, study results extracted and a narrative synthesis was compiled.

Results: In all, 58 publications about social support and SCI were included. Social support was positively related to physical and mental health, pain, coping, adjustment and life satisfaction. Social skills were assessed in 11 studies: social problem solving ($n=7$), assertiveness ($n=3$), verbal communication ($n=1$) and self-monitoring ($n=1$) were examined. Effective problem-solving skills were related to better mental health outcomes, health prevention behavior and less secondary conditions. Assertiveness was related to higher depression in rehabilitation setting. Interventions targeted at social support or social skills were scarcely studied. Only one study examined the relationship between social skills and social support in SCI.

Conclusion: Social support is associated with better health and functioning in individuals with SCI. However, the full range of social skills has not yet been studied in people with SCI. Furthermore, the role of social skills in relation to social support, health and functioning remains unclear. Better understanding of social skills and social support in SCI could facilitate the development of targeted and effective interventions to enhance functioning of people with SCI.

Spinal Cord (2012) **50**, 94–106; doi:10.1038/sc.2011.116; published online 18 October 2011

Keywords: social support; social skills; spinal cord injury

INTRODUCTION

People with spinal cord injury (SCI) face challenges in their everyday lives including limitations in functioning, secondary conditions, medical complications and decreased quality of life.^{1,2} Social support represents an important resource to meet these challenges. Social support is known to positively influence health,^{3–6} life satisfaction^{7,8} and even mortality.^{9,10} Social support is crucial, but can be diminished after SCI.¹¹

Social support is defined as an exchange of resources between individuals intended to enhance the well-being of the recipient.¹² It conveys the information of being loved, cared for, esteemed, valued and bestows a sense of belonging.¹³ Social support can be instrumental (such as tangible assistance), emotional (such as exchange with a close friend) or informational (such as advice from a peer). Social support can be described from a quantitative (for example, network size) or qualitative (for example, satisfaction with support) perspective.^{14–17}

It has been shown that mobilization of social support can be influenced by social skills.^{18–21} Social skills, according to evolutionary theory, are prerequisites for survival and adaptation.²² Depression,^{21,23,24} social phobia,²⁵ substance or alcohol abuse,^{26,27} adherence in rehabilitation,²⁸ life satisfaction and quality of life²⁰ correlate with social skill deficits. Social skills are important for people with

disability. They help to overcome discomfort and stigmatization in social situations, to ask for help, to put others at ease in social relationships, to elicit feedback and to develop and foster social relationships.^{29,30}

Social skills are defined as the ability to interact with other people in a manner that is both appropriate and effective.³¹ They comprise aspects of verbal and non-verbal communication. They include, for example, styles of social problem solving (such as rational, impulsive or avoidant), confidence, assertiveness, goal direction or self-monitoring.³²

There are published reviews on social support in coronary heart disease,³³ stroke,³⁴ cancer³⁵ or diabetes.³⁶ There are also existing reviews on social skills in depression,^{23,24} schizophrenia^{37,38} and autism.^{39,40} In the field of SCI, Kreuter¹¹ has reviewed the literature regarding partner relationships. However, a comprehensive overview on social support or social skills in SCI does not yet exist.

Therefore, the aim of this study is to examine the current knowledge of how social support and social skills are associated with aspects of health, functioning and quality of life of persons living with SCI. The specific aims are to answer the questions (1) which aspects of social support and social skills are addressed in SCI research, (2) which methods are used to assess social support and social skills and (3) to summarize the evidence about social skills and social support in SCI.

¹Swiss Paraplegic Research (SPF), Nottwil, Switzerland; ²Research Unit for Biopsychosocial Health, Institute for Health and Rehabilitation Sciences, Ludwig-Maximilians-University, Munich, Germany and ³Department Health Sciences and Health Policy, University of Lucerne and at SPF, Nottwil, Switzerland
Correspondence: R Müller, Swiss Paraplegic Research, Guido A. Zäch Strasse 4, CH-6207 Nottwil, Switzerland.
E-mail: rachel.mueller@paranet.ch

Received 2 May 2011; revised 25 August 2011; accepted 8 September 2011; published online 18 October 2011

METHODS

A systematic literature review was conducted to identify scientific publications which refer to social support and social skills in people with SCI. The procedures followed five steps: electronic literature search, paper selection, data extraction, quality assessment of the studies and narrative synthesis.

Searches were conducted in Pubmed, Embase, PsycINFO, ERIC (Educational Resources Information Centre), CINAHL (Cumulative Index to Nursing and Allied Health Literature) and the SSCI (Social Sciences Citation Index). The search terms 'social support', 'social skills' and synonyms combined with 'spinal cord injury' were used.

Publications were selected that generate data which target, assess and intervene in social support and/or social skills. Studies referring to different dimensions of social support, that is, type (such as emotional, instrumental, informational), source (such as family, friends, peers) and qualifier (such as satisfaction, appreciation with social support) were selected. Support that is paid, such as professional support, was excluded. The theoretical framework of Liberman³² was used to capture the multidimensional types of social skills (that is, topographical, functional, information processing). The topographical dimension emphasizes on verbal and non-verbal behavior (such as communication skills, eye contact). The functional view defines social skills in terms of the outcome of social interactions (such as assertiveness, self-monitoring). Information-processing skills refer to the individual's ability to attend to, receive, process cues, generate and decide on a response and implement it (for example, social problem solving, decision making). Randomized controlled or clinical trials, cross-sectional or longitudinal studies, published in English between 1990 and 2010 with a sample of people with SCI, who are at least 13 years of age were selected. In addition, studies with a sample size smaller than 30, qualitative and psychometric studies, reviews, meta-analyses and studies in which SCI was not the main target population were excluded.

Data extraction included documentation of the main objective, study design, country, size and description of the sample. In addition, the variables assessed, measurement instruments and the results of the study were extracted.

For quality assessment of the studies, evidence grading according to STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)⁴¹ and PEDro (Physiotherapy Evidence Database) (<http://www.pedro.org.au/english/downloads/pedro-scale/> (cited 30 July 2010)) were implemented. STROBE represents a quality assessment tool for observational studies, which consists 22 items to evaluate the background, study design, data collection and data analysis of the study. PEDro includes 11 criteria, such as randomization, concealed allocation, blinding, etc., relevant for randomized controlled trials. The criteria fulfilled by STROBE and PEDro were counted.

Finally, results about social support and social skills were grouped according to topic domains, which represent the variables in relation to which social support and social skills have been studied. The narrative synthesis⁴² considered the number of studies pertaining to a topic domain, the statistical significance and consistency of the results, the analyses methods and the methodological quality of the study, including design, sample size, application of standardized measures or potential sources of bias.

For quality assurance, paper selection, data extraction (for one-third of the publications) and quality assessment of the studies were conducted in parallel by two independent reviewers. To resolve disagreements between the two reviewers, the original paper was consulted and rating mistakes, if any, were corrected. In case of controversial issues, a discussion was led by a third person, in which the two reviewers stated their pros and cons for the decision regarding paper selection, data extraction or quality assessment. On the basis of these statements, the third person made an informed decision. All review steps were conducted using an MS-Access database (Access 2007, Microsoft Corporation, Redmond, WA, USA.).

RESULTS

The electronic searches in the 6 databases resulted in 795 hits. In all, 58 papers on social support, 11 on social skills and 1 study including both constructs were eligible for analyses (Figure 1). Study characteristics, demographical and lesion-related data of the study populations are summarized in Table 1. The majority of the papers were cross-sectional studies ($n=44$). Most studies were conducted in the United States ($n=32$). Sample sizes ranged between 33 and 1312. Two-thirds of the

Figure 1 Flowchart of the systematic literature review.

participants were male. Paraplegia and tetraplegia, as well as complete and incomplete lesions were approximately equally distributed.

Reviewer agreement on paper selection was 81%. On data extraction of variables and measurement instruments, agreement was 82%, agreement on results was 81% and agreement for STROBE quality assessment was 94%.

Table 2 shows the various aspects of social support addressed in SCI research. Studies focused on emotional ($n=9$), instrumental ($n=9$) and informational ($n=9$) aspects of social support provided by family ($n=8$), friends ($n=8$), intimate partners ($n=8$), peers ($n=1$) and community ($n=1$). Quality, that is, satisfaction with social support ($n=9$) and quantity of social support, for example, numbers of friends ($n=9$), were captured. Table 3 shows the four different social skills examined in persons with SCI: social problem-solving ability ($n=7$), assertiveness ($n=3$), self-monitoring ($n=1$) and communication skills ($n=1$).

In all, 14 standardized self-report instruments assessing social support were used in 58 studies (Table 4). The most commonly used instrument in SCI was the ISEL (Interpersonal Support Evaluation List),⁴³ measuring the availability of different types of social support. Five standardized self-report instruments were used to assess social skills (Table 5). As social problem solving is the most frequently examined social skill in SCI, the Social Problem-Solving Inventory—Revised,⁵⁷ assessing problem orientation and problem-solving skills, was most commonly used.

With regard to study quality, percentage scores on the STROBE ranged from 50.0 to 86.4%. Figure 2 shows the histogram of the results, demonstrating a normal distribution located in the upper half of possible percentage scores (mean=68%; range=50–86%; s.d.=8.76). The quality assessment according to PEDro was used in one study ($N=40$), which scored 7 out of 11⁶¹. Considering the methodological characteristics of the studies, the strengths of evidence is frequently diluted, because most of the results referred to bivariate correlations, which cannot specify direction or causal mechanisms of relationships. In addition, because of the lack of representativeness of the samples, the results of the identified studies cannot be generalized.

Table 1 Characteristics of the 69 papers included about social support (n=58) and social skills (n=11)

	<i>Social support (n=58)</i>	<i>%</i>	<i>Social skills (n=11)</i>	<i>%</i>
<i>Country</i>				
USA	32	55	10	91
Canada	7	12	—	—
UK	5	9	—	—
The Netherlands	2	4	1	9
Denmark	2	4	—	—
France	2	4	—	—
Israel	2	4	—	—
Sweden	2	4	—	—
China	1	1	—	—
Japan	1	1	—	—
South Korea	1	1	—	—
Taiwan	1	1	—	—
<i>Study design</i>				
Observational cross-sectional without control group	38	66	9	82
Observational longitudinal without control group	11	19	1	9
Observational cross-sectional with control group	6	10	—	—
Observational other	2	4	1	9
Intervention RCT	1	1	—	—
Intervention CCT	—	—	—	—
Observational longitudinal with control group	—	—	—	—
<i>Sample size (mean/range)</i>	166 (33–1312)		125 (35–206)	
<i>Age (weighted mean/range in years)</i>	42.5 (25–57)		37.7 (32–46)	
Not specified (n)	11		0	
<i>Gender</i>				
Male		76		78
Female		24		22
Not specified (n)	18		0	
<i>Marital status</i>				
Married (n)		44		36
Not specified (n)	27		9	
<i>Age at injury (weighted mean/range in years)</i>	30.9 (26–37)			—
Not specified (n)	40			11
<i>Severity of injury</i>				
Para		51		43
Tetra		42		40
Complete		53		48
Incomplete		47		51
Traumatic		93		90
Non-traumatic		12		8
Not specified (n)	215		28	
<i>Time since injury (weighted mean/range in month)</i>	148.6 (26–396)		79.6 (1.5–137)	
Not specified (n)	26		3	
<i>Setting</i>				
In-patient	5		4	
Outpatient	9		1	
Community based	10		—	
Mixed	11		3	
Not specified (n)	23		3	

Abbreviations: CCT, controlled clinical trial; RCT, randomized controlled trial.

Table 2 Social support variables and measurement instruments extracted from 58 papers

<i>Social support</i>	<i>In how many studies ...</i>	<i>... measured by^a</i>	<i>Type of instrument</i>
Social support (unspecified)	31	ISEL, PSD	Self-reports
Social support (total score)	6	SPS, PSS, SS-A, CSS, PSD	Self-reports
<i>Functional perspective of social support</i>			
Instrumental support	9	ISEL, SPS, RSSS	Self-reports
Emotional support	9	ISEL, SPS, RSSS, SSSI	Self-reports
Informational support	9	ISEL, SPS, RSSS	Self-reports
<i>Social support sources</i>			
Family	8	PSSS, SSSI	Self-reports
Friends	8	PSSS, SSSI, PSR, NF	Self-reports
Intimate partner	8	CSI	Self-report
Peers	1	PME	Self-report
Community	1	RSSS	Self-report
Quality—satisfaction with social support	9	SSQ, ISEL, CSS	Self-reports
Quantity—structural perspective of social support (that is, network size, frequency of interaction)	9	SSQ, NFFF, CSS	Self-reports

Abbreviations: CSI, Couple Support Inventory; CSS, Crisis Support Scale; ISEL, Interpersonal Support Evaluation List; NF, Number of friends; NFFF, Number of friends, family member and frequency of seeing them; PME, Assessment of past experiences with a SCI mentor; PSD, Procedures of Schulz and Decker (1985); PSSS, Perceived Social Support Scale; PSR, Provision of Social Relationship; RSSS, Reciprocal social support scale; SPS, Social Provisions Scale; SS-A, Social Support Appraisals; SSSI, Source of Social Support Inventory; SSQ, Social Support Questionnaire; UEF, Upset events with family (RSSS—subscale).

^aMost frequently used questionnaires.

Table 3 Social skill variables and measurement instruments extracted from 11 papers

<i>Social skill</i>	<i>In how many studies ...</i>	<i>... measured by</i>	<i>Type of instrument</i>
<i>Social problem-solving ability</i>			
Positive problem orientation	5	SPSI-R	Self-report
Negative problem orientation	5	SPSI-R, subscale	Self-report
Rational problem-solving style	5	SPSI-R, subscale	Self-report
Impulsive/careless problem-solving style	5	SPSI-R, subscale	Self-report
Avoidant problem-solving style	6	SPSI-R, subscale	Self-report
Personal control in problem-solving	1	PSI	Self-report
Problem-solving confidence	1	PSI	Self-report
Assertiveness	3	SCIQ	Self-report
Communication skills	1	FAD	Self-report
Self-monitoring	1	SMS	Self-report

Abbreviations: FAD, Family Assessment Device (communication subscale); PSI, Problem-Solving Inventory (Form A), subscale; SCIQ, Spinal Cord Injury Assertion Questionnaire; SMS, Self-monitoring Scale; SPSI-R, Social Problem-Solving Inventory—revised.

SOCIAL SKILLS AND SOCIAL SUPPORT

Only one cross-sectional study ($N=156$) addressed the relationship of social support to social skills.⁶² Correlations between assertiveness and different types of social support were non-significant ($r=0.13$ to -0.38). However, including the interaction between assertiveness and social support in a multivariate analysis (together with socio-demographic and injury-related variables) revealed an association with depression and psychosocial disability. It indicates that assertive people were found to be more depressed and psychosocially disabled under conditions of high informational support. The model of the relationship between assertiveness and social support accounted for 38% of the variance in depression scores.

SOCIAL SUPPORT

Findings about social support were grouped into eight topical domains (Table 6, Figure 3).

Mental health

The most consistent relationship identified in this review is that between social support and mental health. This is due to the large number of studies that report significant associations between them. In 16 studies ($N=33-256$), social support was associated with lower depression,^{62-74,107,108} helplessness,⁷⁵ pessimism,⁶⁸ negative thoughts about the world and about oneself,^{76,77} alexithymia⁷⁷ and suicidal ideation.^{68,78} In one study, social support accounted for 26.5% of the variance in hopelessness.⁶⁸ In four studies ($N=37-165$) social support correlated with anxiety and moderated the relation between stress and anxiety.^{61,63,65,71} Social support was related to less psychosocial disability ($N=156-290$)^{62,79,80} and lower severity of post-traumatic stress disorder ($N=50-168$) in one longitudinal study.^{76,81-83} Alcohol and drug use ideation was associated with lower quality of social support,⁷¹ and pre-injury drinker reported lower levels of social support and perceived higher family than friend support.⁸⁴

Table 4 Self-report standardized instruments measuring social support extracted from 58 papers

<i>Instrument</i>	<i>In how many studies ...</i>	<i>What does the instrument assess?</i>
Interpersonal Support Evaluation List (ISEL) ⁴³	9	Availability of instrumental, emotional and informational support
Procedures of Schulz and Decker (1985) ⁴⁴	6	Participants are asked to list persons who provide social support and indicate the frequency of examples of support (instrumental, emotional, cognitive) provided by these different persons
Perceived Social Support Scale (PSSS) ^{a, 45}	5	Perceived social support from family and friends added together refer to total score on social support
Social Support Questionnaire (SSQ6) ¹⁷	5	Social support quality in terms of satisfaction, and quantity of social support availability
Social Provisions Scale (SPS) ⁴⁶	4	Functional aspects of social support: attachment, social integration, guidance reassurance of worth, reliable alliance, opportunity for nurturance
Reciprocal Social Support Scale (RSS) ⁴⁷	3	Support given and received. Frequency of advice, emotional, social and material support and negative aspects of social support from family, friends and community
Quantity ^b	4	For example, network size, frequency of interaction
Crisis Support Scale (CSS) ⁴⁸	2	Perceived and received social support after traumatic event: confiding in others, emotional and practical support, negative social support and satisfaction with social support
Social Ties Checklist (STC) ⁴⁹	2	Number of social connections
Personal Resource Questionnaire (PRQ) ⁵⁰	2	Descriptive data about the person's resources, satisfaction with these resources and whether there is a confidant
Multidimensional Scale of Perceived Social Support (MSPSS) ⁵¹	2	Perceived social support from family, friends, significant other and global perceived support
Couple Support Inventory (CSI) ⁵²	1	Existence, quality and quantity of emotional, instrumental/practical and informational support (schemata, availability, behaviors), as well as its motives, characteristics and outcomes
Source of Social Support Inventory (SSSI) ⁵³	1	Emotion- and problem-oriented support from family network, informal network and professional network
Social Support Appraisals (SS-A) ⁵⁴	1	Perception of appreciation, esteem from family, friends and others and integration into community
Provision of Social Relationship (PSR) ⁵⁵	1	Family and friend support
Availability of attachment and social integration (AVAT/AVSI) ⁵⁶	1	Availability of attachment and social integration

^aPSSS Version by Hamilton, 2001: Measuring support received from family, friends, community and government.

^bPatient report.

Table 5 Self-report standardized instruments measuring social skills extracted from 11 papers

<i>Instrument</i>	<i>In how many studies ...</i>	<i>What does the instrument assess?</i>
Social Problem-Solving Inventory—Revised ⁵⁷	5	Problem orientation (positive and negative) and problem-solving skills (rational problem solving, impulsive/careless problem solving, avoidant problem solving)
Problem-Solving Inventory (PSI) ⁵⁸	2	Self-appraised problem-solving ability. Thereby problem-solving confidence, approach avoidance and personal control are assessed
Spinal Cord Assertion Questionnaire (SCIQ) ²⁹	2	Rating of 26 social situation specific to SCI on a 1 (all of the time) to a 5 (never) Likert scale the degree of which the person would likely respond assertively
Communication Subscale of the Family Assessment Device (FAD) ⁵⁹	1	Clarity and directness used in verbal exchanges of information
Self-Monitoring Scale (SMS) ⁶⁰	1	Level of social appropriateness, degree of using social comparison information, degree to which an individual controls and modifies one's presentation of self to others and the extent to which one's presentation of self is tailored to fit the social situation

Abbreviation: SCI, spinal cord injury.

Life satisfaction, subjective well-being and quality of life

Evidence of the relation between social support and life satisfaction, quality and well-being is consistent, showing similar results in different studies. In all, 12 studies ($N=62-256$) showed that social support was associated with life satisfaction, subjective well-being and quality of life.^{64,65,69,72,74,80,85-90} However, lower satisfaction with social life was associated with higher instrumental and informational support, higher emotion-oriented support from friends and lower from family.⁸⁶ The availability of peer support positively affected satisfaction with life.⁷⁴

Mortality, morbidity, secondary conditions and health-care utilization

Evidence regarding social support and association with mortality is mainly supported by a longitudinal study ($N=1312$) on survival analysis. The mortality risk decreased by 14% with every s.d. unit increase in reciprocal social support.⁹¹ With respect to morbidity, 11 studies showed correlations between social support and better health ($N=125-475$),^{72,74,85,86,89,90,92} lower frequency of health problems,⁸⁰ disability-related problems⁸⁰ and secondary conditions,⁹³ such as urinary tract infections^{47,72} and pressure ulcers.^{94,47} Three studies

Figure 2 Distribution of the STROBE results.

showed inconsistent results in the relation between social support and numbers of days in hospital, hospital admissions and doctor visits, depending on the kind and source of social support.^{47,70,87} Emotional support was positively linked to health-care use,⁹³ indicating that the more social support, the more health-care use.

Pain

In four cross-sectional studies ($N=96-182$), correlations between social support and lower degree of pain and catastrophizing were found.^{47,92,95,96} However, the direction of the relationship cannot be determined. Informational and instrumental support were positively related to pain, and negatively related to emotional support.⁴⁷

Beliefs, coping and adjustment

Fairly strong evidence maintains the relation between social support, beliefs, coping and adjustment. Social support was related to self-efficacy^{89,93,97} and hope,⁹⁸ but inconsistently to self-esteem ($N=77-270$).^{98,99} Social support was associated to coping in seven studies ($N=37-255$).^{71,75,81,83,99-101} In one longitudinal study, the perception of social support predicted coping.¹⁰¹ Social support was negatively associated with emotional coping,^{83,99} positively with fighting spirit and sense of humor.^{71,75} Informational support was related to more problem-oriented coping⁹⁹ and an internal coping style was connected to higher levels of support compared with external coping.¹⁰⁰

Social support was correlated with better adjustment to disability in five studies ($N=70-255$)^{47,64,75,77,102} and mediated the relation between leisure engagement and adjustment.¹⁰² Support from friends was associated with acceptance of disability and emotional support with personal growth.^{75,77}

Functioning, activity and participation

Evidence of the relation between social support and functioning is consistent. In all, 10 cross-sectional studies examined aspects of functioning and integration in relation to social support ($N=37-290$). Persons who have more social support,^{69,102} more reciprocal relationships,¹⁰³ more support from peers,⁷⁴ and fewer relationships in which other persons provided more help¹⁰³ were more likely to be mobile, productive and interested in leisure activities. Satisfaction with social support was associated with functional independence.^{71,104} Social and emotional support was linked to better psychological and social functioning.^{74,86} Together with self-efficacy and perceived health, social support was linked to and accounted for 25% of the variance in psychological well-being.^{80,88} However, these studies address very different aspects of functioning, activity and participation.

Sociodemographic and injury-related characteristics

The existing evidence indicates, not always in a consistent manner, that social support is not related to sociodemographic and lesion-related variables. Results of the relation to gender,^{76,77,86,87} education,^{75,80,82,86,87,89} race^{62,89,93} or employment status^{87,89,109} were not significant. The relations to marital status and age were inconsistent, depending on the source and type of support.^{62,70,75,80,86,87,93,98,104} Social support was not related to age at injury^{65,75,77,85,87,89} and level or completeness of injury.^{62,70,76,77,85,89,107}

Overall perceived social support was higher in persons with SCI than in controls without SCI.^{88,105} People with SCI experienced more support than did people with stroke.¹⁰⁴ In three longitudinal studies ($N=40-120$), overall social support did not change over time.^{63,101,110} However, when source and function of support are differentiated, friend and informational support decreased after injury.^{84,101} The family was the most frequently mentioned ($N=308$)⁸⁰ and most important source ($N=52-100$)^{106,111} of social support.

Social support intervention

One intervention study was found, which compared a coping effectiveness training with supportive group therapy.⁶¹ After treatments, anxiety and depression were reduced. However, no differences between the two treatments were found.

SOCIAL SKILLS

Findings about social skills were grouped into four topic domains (Table 7, Figure 3).

Mental and physical health

Evidence regarding the relation between health outcomes and specific social skills is strong but not always consistent. Results from five studies ($N=51-199$) showed a relation between social problem-solving skills and depression or psychosocial disability.¹¹²⁻¹¹⁵ Higher assertiveness was associated with lower depression.¹¹² However, assertive people were more depressed and psychosocially disabled under conditions of high informational support in a rehabilitation setting.⁶² Results about social problem-solving skills and the occurrence of pressure sores^{113,116,117} were inconsistent. One longitudinal study ($N=188$) showed that problem-solving skills were associated with the occurrence of pressure sores in the first 3 years.¹¹⁶ Higher positive problem orientation, a rational problem-solving style, lower impulsive, careless and avoidant style were associated with decreased occurrence of pressure sores.^{116,117} Avoidance of problems was associated with urinary tract infections.¹¹⁷

Personal factors

Evidence for the relation between specific social skills and personal factors, such as locus of control or extroversion, is difficult to summarize, because each of the studies investigate different factors. Being assertive was one of the most difficult problems rated by people with SCI ($N=35$).¹¹⁸ Social problem-solving skills (low negative problem orientation, impulsive, careless and avoidant problem solving, as well as high rational problem solving) were related to acceptance of disability.¹¹²⁻¹¹⁴ Effective problem solving was associated with assertiveness, confidence and perceived control in problem solving, but not with a person's health locus of control.^{112,115} Scoring high in positive problem orientation and using a rational problem-solving style was related to high scores in extroversion, openness to experience, conscientiousness and resilience, low scores in neuroticism, career choice anxiety and generalized indecisiveness.^{113,114} Overall,

Table 6 Summary results on the associations of social support with aspects of health, functioning and quality of life

Associated aspect	Analysis	Result	References
<i>Mental health</i>			
Depression	Correlation	$r=-0.21$ to -0.63	62–73
	Regression	$\beta=-0.20$ to -0.53	62,65,66,68,74
	(M)ANOVA	$F(2.64)=6.02$, $P<0.00$ (before vs after intervention)	61
Helplessness	Correlation	$r=-0.29$ to -0.47	75
	Regression	$\beta=-0.47$ to -0.61	75
Pessimism	Correlation	$r=-0.45$ to -0.57	68
Negative thoughts about the world	Correlation	$r=-0.25$ to -0.31	76,77
Negative thoughts about the self	Correlation	$r=-0.35$ to -0.40	76,77
Alexithymia	Correlation	$r=-0.28$ to -0.31	77
Suicidal ideation	Correlation	$r=-0.58$ to -0.66	68,78
Hopelessness	Correlation	$r=-0.44$ to -0.58	68
	Regression	$\beta=-0.45$, -0.54 ; $R^2=0.26$	68
Anxiety	Correlation	$r=-0.36$ to -0.53	63,65,71
	(M)ANOVA	$F(2.64)=9.49$, $P<0.00$ (before vs after intervention)	61
Psychosocial disability	Correlation	$r=-0.30$ to -0.46	62,79,80
	Regression	$\beta=-0.34$ to -0.36 ; $R^2=0.24-0.27$	62,79
PTSD	Correlation	$r=-0.24$ to -0.48	76,81–83
	(M)ANOVA	$F(1)=4.3$ (PTSD vs non-PTSD)	83
	Regression	$\chi^2=29.6$, $df=8$	83
Alcohol and drug use ideation	Correlation	$R=-0.35$	71
Alcohol consumption	(M)ANOVA	$F(1.171)=3.27$, $P=0.08$ (drinker vs non-drinker)	84
		$F(3)=3.16$, $P=0.03$ (family vs friend support)	84
<i>Life satisfaction, subject well-being, quality of life</i>			
Life satisfaction	Correlation	$R=0.21-0.75$	64,65,69,72,85,86
	Regression	$\beta=0.52$	65
	ANCOVA	$F=4.26$; $\eta^2=0.072^a$	87
	Path analysis	$R=0.25-0.48$	86
Subjective well-being	Regression	$\beta=0.22-0.30$	80,88–90
Quality of life	Regression	$R^2=0.40$	74
<i>Mortality, morbidity, secondary conditions, health-care utilization</i>			
Mortality	Survival analysis	$s.d.=17.5(3.9)/SHR^b=0.86$	91
Health	Correlation	$r=0.29-0.34$	72,85,86,89,90
	Regression	$\beta=0.14-0.29$	74,90,92
Health/disability-related problems	Correlation	$r=-0.16-0.27$	80
Secondary conditions	Correlation	$r=-0.16$	93
	Path analysis	$r=-0.15$	93
Urinary tract infection (UTI)	Correlation	$r=-0.21$	47
	Difference	$t(138)=2.01$, $P<0.05$ (UTI vs non-UTI)	72
Pressure sores	Correlation	$r=-0.23$ to -0.32	47
	Regression	$OR=0.98-0.99$	94
Health-care use	Path analysis	$r=0.17$	93
<i>Pain</i>			
Pain	Correlation	$r=-0.17$ to -0.28 (emotional support)	47,92
		$r=0.19-0.27$ (informational/instrumental support)	
	(M)ANOVA	$F(6.6)$, $P<0.01$ (Dysfunctional vs adaptive copers vs interpersonally supported)	95
	(M)ANOVA	$F(4.27)$, $P<0.02$ (consistent vs inconsistent pain)	96
Catastrophizing	Correlation	$r=-0.30$	92
<i>Beliefs, coping and adjustment</i>			
Self-efficacy	Correlation	$r=0.26-0.43$	89,93,97
Hope	Correlation	$r=0.89$	98
	Regression	$\beta=0.47$	98
Self-esteem	Correlation	$r=0.23-0.80$	98,99
Coping	Correlation	$r=0.22-0.47$	71,75,83,99
	(M)ANOVA	$F=29.52$, 20.11 , $P<0.00$	100
	Path analysis	$r=0.19-0.37$	99,101

Table 6 Continued

Associated aspect	Analysis	Result	References
Adjustment to disability	Correlation	$r=0.19-0.43$	47,64,75,77
	Path analysis	$r=0.65$	102
Acceptance	Correlation	$r=0.27-0.34$	75,77
Personal growth	Correlation	$r=0.23-0.26$	75
	Regression	$\beta=0.44$	75
<i>Functioning, activity and participation</i>			
Mobility	Correlation	$r=0.22$	103
Productivity	Correlation	$r=0.24$	103
Leisure activity	Correlation	$r=0.25-0.33$	69
	Path analysis	$r=0.21$	102
Independence	Correlation	$r=0.19-0.36$	71,103
	Regression	$R^2=0.03-0.05$	104
Functioning	Regression	$\beta=0.12-0.22$	74,80,88,104
	Path analysis	$r=0.37-0.41$	86
Participation	ANCOVA	$F=5.24$; $\eta^2=0.09^a$	87
<i>Socio-demographic and injury-related characteristics</i>			
	Difference	$t=2.06-3.31$, $P<0.05-P<0.00$ (SCI vs non-SCI)	88,105
	Difference	$t=2.77$, $P<0.05$ (SCI vs stroke)	104
	(M)ANOVA	$F(1)=9.21$, $P=0.00$ (family vs friend support), NA	84,101
	Descriptive	65%, 94% (family as most important)	80,106

Abbreviations: ANCOVA, analysis of covariance; ANOVA, analysis of variance; NA, not available; OR, odds ratio; PTSD, post-traumatic stress disorder; SHR, standardized hazard ratio.

Only significant and consistent results are shown.

^aF-test for covariate for main and interaction effect and η^2 .

^bStandardized hazard ratio.

Figure 3 Overview of the systematic literature review results.

only five cross-sectional studies dealt with the relation between specific social skills and personal factors.

Activity, participation and life satisfaction

Three cross-sectional studies ($N=51-206$) examined activity, participation and life satisfaction and their relation to social skills.¹¹⁹⁻¹²¹ Positive problem orientation and rational problem solving were

associated with performing more wellness and accident prevention behavior.¹¹⁹ Individuals with SCI who were high in self-monitoring did not differ from those who were low in self-monitoring on free time boredom, but they participated more frequently in recreation activities and socializing, and perceived higher freedom in leisure.¹²⁰ Communication skills of 158 individuals correlated with life satisfaction, but in regression analysis no significant contribution was found.¹²¹

Table 7 Summary results on the associations of social skills with aspects of health, functioning and quality of life

<i>Social skills</i>	<i>Associated aspect</i>	<i>Analysis</i>	<i>Result</i>	<i>References</i>
<i>Mental health</i>				
Assertiveness	Depression	Correlation	$r=-0.19$	112
		Regression	$F_{inc}(1,15)=3.95, P<0.05, R^2_{inc}=0.02$	62
Social problem solving	Depression	Correlation	$r=-0.19$ to -0.50	112–114
		Regression	$F_{inc}(1,83)=21.18, P<0.00, R^2_{inc}=0.18$	112
Assertiveness	Psychosocial disability	Regression	$F_{inc}(1,15)=4.78, P<0.05, R^2_{inc}=0.03$	62
Social problem solving	Psychosocial disability	Correlation	$r=-0.34$	115
		Regression	$\beta=-0.42$	115
		Regression	$F_{inc}(1,83)=13.01, P<0.00, R^2_{inc}=0.12$	112
<i>Physical health</i>				
Social problem solving	Pressure sores	Path analysis	$r=-0.23$ to -0.67	113,116
		Regression	$\beta=-0.23$	116
		DFA ²	SDFC=0.56, Wilks' $\lambda=0.79^a$	117
	Urinary tract infection	DFA ²	SDFC=0.41, Wilks' $\lambda=0.34^a$	117
<i>Personal factors</i>				
Assertiveness		Descriptive	37% (most difficult problem)	118
Social problem solving	Acceptance of disability	Correlation	$r=0.24-0.39$	112–114
		Regression	$\beta=0.15, 0.17$	113
Social problem solving	Assertiveness	Correlation	$r=0.20-0.25$	112
	Confidence in problem solving	Correlation	$r=0.84$	112
	Control in problem solving	Correlation	$r=0.76$	112
	Extraversion	Correlation	$r=0.36; 0.33$	114
	Openness to experience	Correlation	$r=0.29$	114
	Conscientiousness	Correlation	$r=0.41, 0.44$	114
	Resilience	Difference	$d=0.59, 0.81^b$ (resilient vs non-resilient)	114
	Neuroticism	Correlation	$r=-0.25, 0.31$	114
	Generalized indecisiveness	Correlation	$r=-0.29$	113
		Regression	$\beta=0.17$	113
<i>Activity, participation and life satisfaction</i>				
Social problem solving	Accident prevention- and wellness behavior	Correlation	$r=0.28-0.36$	119
Self-monitoring	Activity and socializing	(M)ANOVA	$F(1,18)=9.65, P=0.00$, (high vs low in self-monitoring)	120
	Freedom in leisure	(M)ANOVA	$F(1,18)=21.08, P=0.00$ (high vs low in self-monitoring)	120
Communication skills	Life satisfaction	Correlation	$r=0.20$	121
<i>Sociodemographic and injury-related characteristics</i>				
Assertiveness, Social problem solving	Age	Correlation	$r=0.20; -0.17, -0.42$ (NPO)	112,113,119
	Education	Correlation	$r=0.20, 0.33$	112,119
Assertiveness, Social problem solving, communication skills	Level of injury	Correlation	$r=-0.15, -0.29$	62,112,113,116

Abbreviations: ANOVA, analysis of variance; DFA, discriminant function analysis; NPO, negative problem orientation; SDFC, step-wise discriminant function analysis

Only significant and consistent results are shown.

^a λ , Standardized discriminant function coefficient and Wilks' lambda.^bCohen's d .

Sociodemographic and injury-related characteristics

The evidence is inconsistent regarding the relation of social skills to sociodemographic and lesion-related variables. In four studies, social problem-solving skills did not correlate with gender and race.^{113,115,116,119} Assertiveness and effective social problem solving were related to higher levels of education and age.^{112,113,116,119} People with paraplegia were found to be slightly more effective communicators and problem solvers than were people with tetraplegia,^{113,121} and higher the level of SCI, the lower the tendency to act assertively.^{62,112}

DISCUSSION

This literature review provides a systematic overview on the current state of research in SCI about the relationship of social support and social skills with health and well-being outcomes. The full range of aspects pertaining to social support (that is, type, source, qualifier) and social skills dimensions (that is, topographical, functional, information-processing skills) were addressed in SCI research. However, five times more studies on social support compared with social skills and only one study addressing both concepts in SCI were found. Most

studies are of cross-sectional design. In the past 20 years, only few longitudinal and intervention studies were conducted and social support and social skills were mainly measured by self-report questionnaires.

The only study examining both social support and social skills in SCI indicated that the social skills of an individual are correlated with the outcome of social support exchange.⁶² Research in the general population^{19,20} and in mental illness^{18,21} shows that social skills are correlated with social support. However, the relationship between social skills and social support and the association of the two with health and quality of life remain unclear. Therefore, a key finding of this review is that there is a need for future research in SCI to confirm whether effective social skills can mobilize social support and how.

In general, the results confirm that social support and social skills are positively related to physical and mental health. Social support seemed to decrease the risk of mortality, facilitate coping and enhance life satisfaction and subjective well-being in people with SCI. Socio-demographic and lesion-related variables were rarely associated with social support but can be related with social skills. Whether a person with effective social skills does mobilize social support and is in turn healthier and more satisfied remains to be explored.

The studies included in this review have fulfilled at least 50% of the STROBE quality criteria. However, most of the studies are of cross-sectional design and hence, do not clarify cause-effect mechanisms. For example, the results show that social support is associated with higher levels of well-being. However, the literature also indicates that well-being of a person with SCI predicts the availability of social support.⁸⁰ In addition, moderating and mediating effects or change and time effects stay concealed with cross-sectional studies. Longitudinal research is required in future. This could be facilitated, for example, by building registries or research platforms similar to those in the US Model Systems.¹²² Such platforms should include a comprehensive set of assessment domains addressing all dimensions of functioning and disability, as well as contextual and personal factors, for example, according to the ICF (International Classification of Functioning, Disability and Health).¹²³

The findings of this review in SCI are largely in line with current research. The relationship of social support with mortality,^{9,10} physical and mental health,^{3-6,124-126} coping¹²⁷⁻¹²⁹ and life satisfaction⁷ has been confirmed in the general population and in other diseases.¹³⁰⁻¹³² Social support is also related to the available strengths and internal resources of persons with SCI.¹³ Social skills have been found to relate to physical and mental health in the general population^{58,133,134} and other diseases.^{21,23-27}

There are only few studies addressing social skills in SCI. The concept of social skills is difficult to define. Social skills, social competence, social intelligence or social performance are often used interchangeably.²³ In addition, social skills does not seem to change in SCI. However, social skills are important in the development and maintenance of interpersonal relationships, in general and in SCI.¹²¹ Social skills training has shown its effectiveness in general population,¹³⁵ with children and adolescents¹³⁶ in relation to mental^{124,37} and physical health.¹³⁷⁻¹³⁹ In SCI, there are two publications but small sample sizes.^{140,141} Intervention studies in social skills have also reported improvements in social support ratings.¹⁴² Therefore, social skills training could be integrated in treatment plans¹⁴³ and could also prepare people with acquired SCI for difficult social situations.

Only specific social skills, such as social problem solving or assertiveness were examined. General social skills as they are assessed, for example, by the Social Skills Inventory¹⁴⁴ are not addressed in SCI. Clinical interviews or behavioral observation (for example, role play)

are comprehensive assessments used in general practice to assess social skills.¹⁴⁵ They are demanding in terms of administration and analysis. Few instruments exist that have been designed specifically for SCI, such as the SCIQ (Spinal Cord Injury Assertion Questionnaire).²⁹

Looking at issues of measurement, in SCI and in the general population, mostly the different types of social support are measured. However, instruments also assessing the quality and not only the quantity of social support should be considered in research, as quality^{63,68,71-73} not quantity^{63,68,76,81} of social support is linked to mental health. Overall, a 'gold standard' in assessing social support does not exist; nonetheless, investigators must determine what aspect of social support they consider as important to be evaluated in relation to their specific research question.¹⁴²

Demographic characteristics of a person do not affect the amount of support perceived. However, there seems to be a difference in levels of importance of social support for older compared with younger people.¹⁴⁶ The relation between being married and social support was inconsistent. This may reflect the difference in assessment of quantitative and qualitative aspects of marital support and being married is only a source of social support if the marriage is a good one.^{147,148} However, social support, in specific marriage, is also affected by SCI.¹⁰⁴ Divorce rates in people with SCI range between 8 and 48%.¹¹ Although SCI represents a major burden to the spouses,¹⁴⁹ partners report also some positive changes, such as more open and honest communication.¹⁵⁰ To strengthen marriage as an important social support system, comprehensive support should be provided to caregivers, for example, in terms of relationship counseling.

Social support was slightly related to the type of disability (SCI vs stroke), but not to the level of injury. Assistance to people with SCI, due to the physical impairment, is in large part support that is paid. However, this kind of support was not included in this review.

Although social support was consistently found to be positively related to life satisfaction, subjective well-being and quality of life, one study showed somewhat contradictory findings.⁸⁶ Although social support is considered a positive concept, social relationships may also serve as sources of stress.^{151,152} The results show that higher instrumental and informational support and emotional support from friends are related to lower satisfaction with social life.⁸⁶ This type of social support might lead to unsatisfactory social life, because it may act as a constant reminder of the presence and impact of the disability. It reflects a relative inequality of exchange between the provider and recipient and fosters the feeling of being 'in debt'.^{64,153} In SCI, negative experience of support may lead to dysfunctional coping styles,⁸³ exacerbate acceptance to disability,⁴⁷ enhance the risk of developing post-traumatic stress disorder^{81,83} and is related to numerous health conditions.⁴⁷ Social skills, such as assertiveness, are helpful in general life situations, but can also have negative effects. In rehabilitation, assertive people with SCI may encounter increased attempts from health professionals to control their behavior, while receiving care and treatment.²⁹ As a result, assertive persons may experience more psychological distress.⁶²

Limitations

The study is subject to several limitations: First, search terms were specific to social support and excluded broader terms such as social integration. Terms referring to participation, which is understood as involvement in a life situation,¹⁵⁴ were excluded. Articles about social relationships were only included if the relationship provides support in some way. For example, papers comprising the term 'marital status' were only included, if support by marriage, such as spousal support, was examined.

Second, the selection criteria regarding age, qualitative studies and sample size are disputable. Basic social skills are learned and more or less effective for good developmental outcome and adaptation around the age of 13 years.^{155–157} However, the development of social skills is not completed at a certain age. Qualitative studies provide detailed insights and the possibility to generate hypothesis¹⁵⁸ and could be addressed in a separate review. The decision to solely include studies with $N \geq 30$ is based on reasons of generalizability and power of analyses.¹⁵⁹

Third, using STROBE for quality grading can be problematic. STROBE has been applied to assess study quality in a wide variety of systematic literature reviews.^{160–162} However, STROBE addresses the reporting of studies rather than their quality.¹⁶³ A standardized interpretation manual for STROBE scoring does not exist. In addition, results from studies with higher scores in the quality assessment tool were not weighted differently than were results from studies with lower quality.

CONCLUSIONS

This systematic literature review provides guidance for future research. The focus should be set on longitudinal and intervention studies. Social skills can mobilize social support,^{18–21,62} which is an important facilitating environmental factor in people with SCI and in the general population.^{3–10}

People with SCI need all the social support they can get. Therefore, strengthening the social support system of a person, for example, the family, is an important aim in rehabilitation counseling. However, patients should not be seen as passive recipients of support and dependent on others, but rather as persons who can actively and autonomously shape their social relations by using their social skills. Thus, social skills can be an important intervention target in rehabilitation.

However, the relationship between social skills and social support, and how this interrelation operates in relation to health and functioning, have not been fully understood in SCI. The results of further studies could contribute to the development of targeted interventions to enhance functioning, health and quality of life of people with SCI.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

The project was funded by the Swiss Paraplegic Research (SPF) in Nottwil, Switzerland.

- 1 Post M, de Witte LP, van Asbeck FW, van Dijk AJ, Schrijvers JP. Predictors of health status and life satisfaction in spinal cord injury. *Arch Phys Med Rehab* 1998; **79**: 395–401.
- 2 Chiodo A, Scelza M, Kirshblum S, Wuermers L, Ho ChH, Priebe MM. Spinal cord injury medicine. 5. Long-term medical issues and health maintenance. *Arch Phys Med Rehab* 2007; **8**: 76–83.
- 3 Steptoe A, Lundwall K, Croypley M. Gender, family structure and cardiovascular activity during the working day and evening. *Soc Sci Med* 2000; **50**: 531–539.
- 4 Ali S, Merlo J, Rosvall M, Lithman T, Lindström M. Social capital, the miniaturisation of community, traditionalism and first time acute myocardial infarction: a prospective cohort study in southern Sweden. *Soc Sci Med* 2006; **63**: 2204–2217.
- 5 Brown G, Bhrolchain MN, Harris T. Social class and psychiatric disturbance among women in an urban population. *Sociology* 1975; **9**: 225–254.
- 6 Norbeck J. Types and sources of social support for managing job stress in critical care nursing. *Nurs Res* 1985; **34**: 225–230.
- 7 Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull* 1985; **98**: 310–357.
- 8 Helgeson V. Social support and quality of life. *Qual Life Res* 2003; **12**: 25–31.
- 9 Berkman L, Syme SL. Social networks, host resistance, and mortality: a nine year follow up study of Alameda County residents. *Am J Epidemiol* 1979; **109**: 186–204.
- 10 Gruenewald T, Karlamangla AS, Greendale GA, Singer BH, Seeman TE. Feelings of usefulness to others, disability, and mortality in older adults: the MacArthur Study of successful aging. *J Gerontol B Psychol Sci Soc Sci* 2007; **62**: 28–37.
- 11 Kreuter M. Spinal cord injury and partner relationships. *Spinal Cord* 2000; **38**: 2–6.
- 12 Shumaker S, Brownell LA. Toward a theory of social support: closing conceptual gaps. *J Soc Issues* 1984; **40**: 11–36.
- 13 Cobb S. Social support as a moderator for life stress. *Psychosom Med* 1976; **38**: 300–314.
- 14 Antonucci T. Personal characteristics, social support, and social behavior. In: Binstock R, Shanas A (eds). *Handbook of Aging and the Social Sciences*. Van Nostrand-Reinhold: New York, 1985 pp. 94–128.
- 15 House J, Kahn RL. Measures and concepts of social support. In: Cohen J, Syme SL (eds). *Social Support and Health*. Academic Press: New York, 1985, pp. 83–108.
- 16 Kahn R, Antonucci TC. Convoys over lifecourse: attachment, roles and social support. In: Baltes P, Brim O (eds). *Life-Span Development and Behavior*. Academic Press: New York, 1980, pp. 253–286.
- 17 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.
- 18 Macdonald E, Jackson HJ, Hayes RL, Baglioni Jr AJ, Madden C. Social skill as a determinant of social networks and perceived social support in schizophrenia. *Schizophr Res* 1998; **29**: 275–286.
- 19 Riggio R, Waring KP, Throckmorton B. Social skills, social support, and psychosocial adjustment. *Pers Indiv Differ* 1993; **15**: 275–280.
- 20 Segrin C, Taylor M. Positive interpersonal relationships mediate the association between social skills and psychological well-being. *Pers Indiv Differ* 2007; **43**: 637–646.
- 21 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**: 962–971.
- 22 Bar-On R. The Bar-On model of emotional-social intelligence (ESI). *Psychothera* 2006; **18**: 13–25.
- 23 Segrin C. Social skills deficits associated with depression. *Clin Psychol Rev* 2000; **20**: 379–403.
- 24 Tse W, Bond AJ. The impact of depression on social skills. *J Nerv Ment Dis* 2004; **192**: 260–268.
- 25 Stravynski A, Amado D. Social phobia as a deficit in social skills. In: Hofmann SG, Marten DiBartol P (eds). *From Social Anxiety to Social Phobia*. Allyn and Bacon: Boston, 2001.
- 26 Platt J, Hermalin J. Social skills deficit interventions for substance abusers. *Psychol Addict Behav* 1989; **3**: 114–133.
- 27 Monti P, O'Leary TA. Coping and social skills training for alcohol and cocaine dependence. *Psychiat Clin N Am* 1999; **22**: 447–469.
- 28 Johnson M, Elliott TR, Neilands TB, Morin SF, Chesney MA. A social problem-solving model of adherence to HIV medications. *Health Psychol* 2006; **25**: 355–363.
- 29 Dunn M, Herman S. Social skills and physical disability. In: Doleys D, Meredith R (eds). *Behavioral Medicine: Assessment and Treatment Strategies*. Plenum Press: New York, 1982, pp. 117–144.
- 30 Glueckauf RL, Quittner AL. Assertiveness training for disabled adults in wheelchairs: self-report, role-play, and activity pattern outcomes. *J Consult Clin Psychol* 1992; **60**: 419–425.
- 31 Segrin C. Specifying the nature of social skill deficits associated with depression. *Hum Commun Res* 1992; **19**: 89–123.
- 32 Liberman RP. Assessment of social skills. *Schizophr Bull* 1982; **8**: 62–83.
- 33 Barth J, Schneider S, von Känel R. Lack of social support in the etiology and the prognosis of coronary heart disease: a systematic review and meta-analysis. *Psychosom Med* 2010; **72**: 229–238.
- 34 Salter K, Foley N, Teasell R. Social support interventions and mood status post stroke: a review. *Int J Nurs Stud* 2010; **47**: 616–625.
- 35 Nausheen B, Gidron Y, Peveler R, Moss-Morris R. Social support and cancer progression: a systematic review. *J Psychosom Res* 2009; **67**: 403–415.
- 36 Wysocki T, Greco P. Social support and diabetes management in childhood and adolescence: influence of parents and friends. *Curr Diabetes Rep* 2006; **6**: 117–122.
- 37 Kopelowicz A, Liberman RP, Zarate R. Recent advances in social skills training for schizophrenia. *Schizophr Bull* 2006; **32**: S12–S23.
- 38 Smith T, Bellack AS, Liberman RP. Social skills training for schizophrenia: review and future directions. *Clin Psychol Rev* 1996; **16**: 599–617.
- 39 Weiss M, Harris SL. Teaching social skills to people with autism. *Behav Modif* 2001; **25**: 785–802.
- 40 Strain P. Empirical based social skills interventions: a case for quality-of-life improvement. *Behav Disord* 2001; **27**: 30–36.
- 41 Vandenbroucke J, von Elm E, Altman DG, Gotzsche PC, Mulrow CD, Pocock SJ et al. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. *PLoS Med* 2007; **4**: 1628–1654.
- 42 Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M et al. Guidance on the conduct of narrative synthesis in systematic reviews. http://www.lancs.ac.uk/shm/research/nssr/research/dissemination/publications/NS_Synthesis_Guidance_v1.pdf, 2006.
- 43 Cohen S, Mermelstein R, Kamarck T, Hoberman HM. Measuring the functional components of social support. In: Sarason I, Sarason BR (eds). *Social Support: Theory, Research and Applications*. Martinus Nijhoff: Boston, 1985.

- 44 Schulz R, Decker S. Long-term adjustment to physical disability: the role of social support, perceived control, and self-blame. *J Pers Soc Psychol* 1985; **48**: 62–72.
- 45 Procidano M, Heller K. Measures of perceived social support from friends and from family: three validation studies. *Am J Community Psychol* 1983; **11**: 1–24.
- 46 Cutrona C, Russell DW. The provisions of social relationships and adaptation to stress. In: Jones W, Perlman D (eds). *Advances in Personal Relationships*. JAI: Greenwich, CT, 1987, pp. 37–67.
- 47 Anson C, Stanwyck DJ, Krause JS. Social support and health status in spinal cord injury. *Paraplegia* 1993; **31**: 632–638.
- 48 Joseph S, Yule W, Williams R, Yule W. Crisis support and psychiatric symptomatology in adult survivors of the Jupiter Cruise ship disaster. *Br J Clin Psychol* 1993; **32**: 177–185.
- 49 Starr L, Robinson RG, Price TR. The social functioning exam: an assessment of stroke patients. *Soc Work Res Abstr* 1983; **18**: 28–33.
- 50 Weinert C. Measuring social support: PRQ2000. In: Dilorio OSC (ed). *Measurement of Nursing Outcomes: Self-Care and Coping*. Springer: New York, 2003, pp. 161–172.
- 51 Zimet G, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess* 1988; **52**: 30–41.
- 52 Gilad D, Lavee Y, Innes-Kenig O. The structure of dyadic support among couples with and without long-term disability. *J Behav Med* 2009; **32**: 453–465.
- 53 Komprou I, Rijken PM, Hoeks IAML, Ros WJG. Sociale steun en welbevinden (social support and well-being). Utrecht University, Utrecht, 1991.
- 54 Vaux A, Philipps J, Holly L, Thomson B, Williams D, Stewart D. The Social Support Appraisals (SS-A) scale: studies of reliability and validity. *Am J Community Psychol* 1989; **14**: 195–219.
- 55 Turner R, Frankel BG, Levin DM. Social support: conceptualization, measurement, and implications for mental health. *Res Comm Men Health* 1983; **3**: 67–111.
- 56 Henderson S, Duncan-Jones P, Byrne DG, Scott R. Measuring social relationships. The interview schedule for social interaction. *Psychol Med* 1980; **10**: 723–734.
- 57 D'Zurilla T, Nezu AM, Meydeu-Olivares A. *Social Problem-Solving (SPSI-R): Technical Manual*. Multi-Health Systems: North Tonawanda, NY, 2002.
- 58 Heppner P. *The Problem-Solving Inventory: Manual*. Consulting Psychologists Press: Palo Alto, CA, 1988.
- 59 Epstein N, Baldwin LM, Bishop DS. The McMaster family assessment device. *J Marital Fam Ther* 1983; **9**: 171–180.
- 60 Snyder M. *Public Appearances, Private Realities: The Psychology of Self-Monitoring*. Freeman: New York, 1987.
- 61 Duchnick J, Letsch EA, Curtiss G. Coping effectiveness training during acute rehabilitation of spinal cord injury/dysfunction: a randomized clinical trial. *Rehabil Psychol* 2009; **54**: 123–132.
- 62 Elliott T, Herrick SM, Patti AM, Witty TE, Godshall FJ, Spruell M. Assertiveness, social support, and psychological adjustment following spinal cord injury. *Behav Res Ther* 1991; **29**: 485–493.
- 63 Kennedy P, Rogers BA. Anxiety and depression after spinal cord injury: a longitudinal analysis. *Arch Phys Med Rehabil* 2000; **81**: 932–937.
- 64 McColl M, Rosenthal C. A model of resource needs of aging spinal cord injured men. *Paraplegia* 1994; **32**: 261–270.
- 65 Rintala D, Robinson-Whelen S, Matamoros R. Subjective stress in male veterans with spinal cord injury. *J Rehabil Res Dev* 2005; **42**: 291–304.
- 66 Elliott T, Herrick SM, Witty TE, Godshall F, Spruell M. Social support and depression following spinal cord injury. *Rehabil Psychol* 1992; **37**: 37–48.
- 67 Radnitz C, Danner G. Recovery from posttraumatic stress disorder in veterans with spinal cord injury. *SCI Psychosocial Process* 2002; **15**: 190–197.
- 68 Beedie A, Kennedy P. Quality of social support predicts hopelessness and depression post spinal cord injury. *J Clin Psychol Med S* 2002; **9**: 227–234.
- 69 Coyle C, Shank JW, Kinney W, Hutchins DA. Psychosocial functioning and changes in leisure lifestyle among individuals with chronic secondary health problems related to spinal cord injury. *Ther Recreation J* 1993; **27**: 239–252.
- 70 Herrick S, Elliott TR, Crow F. Social support and the prediction of health complications among persons with spinal cord injuries. *Rehabil Psychol* 1994; **39**: 231–250.
- 71 Pollard C, Kennedy P. A longitudinal analysis of emotional impact, coping strategies and post-traumatic psychological growth following spinal cord injury: a 10-year review. *Brit J Health Psych* 2007; **12**: 347–362.
- 72 Rintala D, Young ME, Hart KA, Clearman RR, Fuhrer MJ. Social support and the well-being of persons with spinal cord injury living in the community. *Rehabil Psychol* 1992; **37**: 155–163.
- 73 Stroud M, Turner JA, Jensen MP, Cardenas DD. Partner responses to pain behaviors are associated with depression and activity interference among persons with chronic pain and spinal cord injury. *J Pain* 2006; **7**: 91–99.
- 74 Elfstrom M, Ryden A, Kreuter M, Taft C, Sullivan M. Relations between coping strategies and health-related quality of life in patients with spinal cord lesion Focus on coping. *J Rehabil Med* 2005; **37**: 9–16.
- 75 Elfstrom M, Kreuter M, Ryden A, Persson LO, Sullivanand M. Effects of coping on psychological outcome when controlling for background variables: a study of traumatically spinal cord lesioned persons Focus on coping. *Spinal Cord* 2002; **40**: 408–415.
- 76 Agar E, Kennedy P, King NS. The role of negative cognitive appraisals in PTSD symptoms following spinal cord injuries. *Behav Cogn Psychother* 2006; **34**: 437–452.
- 77 Hatcher M, Whitaker C, Karl A. What predicts post-traumatic stress following spinal cord injury? *Brit J Health Psych* 2009; **14**: 541–561.
- 78 Kishi Y, Robinson RG. Suicidal plans following spinal cord injury. *J Neuropsychiatry* 1996; **8**: 443–445.
- 79 Elliott T, Herrick SM, Witty TE, Godshall F, Spruell M. Social relationship and psychosocial impairment of person with SCI. *Psychol Health* 1992; **7**: 55–67.
- 80 McColl M, Arnold R, Charlifue S, Gerhart K. Social support and aging with a spinal cord injury: Canadian and British experiences. *Top Spinal Cord Inj Rehabil* 2001; **6**: 83–101.
- 81 Nielsen M. Prevalence of posttraumatic stress disorder in persons with spinal cord injuries: the mediating effect of social support. *Rehabil Psychol* 2003; **48**: 289–295.
- 82 Danner G, Radnitz CL. Protective factors and posttraumatic stress disorder in veterans with spinal cord injury. *Int J Rehabil Health* 2000; **5**: 195–203.
- 83 Nielsen M. Crisis support and coping as mediators of well-being in persons with spinal cord lesion. *J Clin Psychol Med S* 2003; **10**: 91–99.
- 84 Boraz M, Heinemann AW. The relationship between social support and alcohol abuse in people with spinal cord injuries. *Int J Rehabil Health* 1996; **2**: 189–198.
- 85 Fuhrer M, Rintala DH, Hart KA, Clearman R, Young ME. Relationship of life satisfaction to impairment, disability, and handicap among persons with spinal cord injury living in the community life satisfaction. *Arch Phys Med Rehabil* 1992; **73**: 552–557.
- 86 Post M, Ros WJG, Schrijvers AJP. Impact of social support on health status and life satisfaction in people with a spinal cord injury. *Psychol Health* 1999; **14**: 679–695.
- 87 Sherman J, DeVinney DJ, Sperling KB. Social support and adjustment after spinal cord injury: influence of past peer-mentoring experiences and current live-in partner. *Rehabil Psychol* 2004; **49**: 140–149.
- 88 Hampton N. The affective aspect of subjective well-being among Chinese people with and without spinal cord injuries. *Disabil Rehabil* 2008; **30**: 1473–1479.
- 89 Hampton N. Subjective well-being among people with spinal cord injuries: the role of self-efficacy, perceived social support, and perceived health. *Rehabil Couns Bull* 2004; **48**: 31–37.
- 90 Forchheimer M, Tate DG. The relationship of spirituality and depression to health among people with spinal cord injury. *Top Spinal Cord Inj Rehabil* 2007; **12**: 23–34.
- 91 Krause J, Carter RE. Risk of mortality after spinal cord injury: relationship with social support, education, and income. *Spinal Cord* 2009; **47**: 592–596.
- 92 Raichle K, Hanley M, Jensen MP, Cardenas DD. Cognitions, coping, and social environment predict adjustment to pain in spinal cord injury. *J Pain* 2007; **8**: 718–729.
- 93 Suzuki R, Krahn GL, McCarthy MJ, Adams EJ. Understanding health outcomes: physical secondary conditions in people with spinal cord injury. *Rehabil Psychol* 2007; **52**: 338–350.
- 94 Saladin L, Krause JS. Pressure ulcer prevalence and barriers to treatment after spinal cord injury: comparisons of four groups based on race-ethnicity. *Neurorehabilitation* 2009; **24**: 57–66.
- 95 Widerstrom-Noga E, Cruz-Almeida Y, Felix ER, Adcock JP. Relationship between pain characteristics and pain adaptation type in persons with SCI. *J Rehabil Res Dev* 2009; **46**: 43–56.
- 96 Rintala D, Hart KA, Priebe MM. Predicting consistency of pain over a 10-year period in persons with spinal cord injury. *J Rehabil Res Dev* 2004; **41**: 75–88.
- 97 Pang M, Eng JJ, Lin KH, Tang PF, Hung C, Wang YH. Association of depression and pain interference with disease-management self-efficacy in community-dwelling individuals with spinal cord injury. *J Rehabil Med* 2009; **41**: 1068–1073.
- 98 Piazza D, Holcombe J, Foote A, Paul P, Love S, Daffin P. Hope, social support and self-esteem of patients with spinal cord injuries. *J Neurosci Nurs* 1991; **23**: 224–230.
- 99 Song H. Modeling social reintegration in persons with spinal cord injury. *Disabil Rehabil* 2005; **27**: 131–141.
- 100 Chan R, Lee PWH, Lieh-Mak F. The pattern of coping in persons with spinal cord injuries. *Disabil Rehabil* 2000; **22**: 501–507.
- 101 McColl M, Lei H, Skinner H. Structural relationships between social support and coping. *Soc Sci Med* 1995; **41**: 395–407.
- 102 Loy D, Dattilo J, Kleiber DA. Exploring the influence of leisure on adjustment: development of the leisure and spinal cord injury adjustment model. *Leisure Sci* 2003; **25**: 231–255.
- 103 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.
- 104 McColl M, Friedland J. The effects of age and disability on social support. *Int J Rehabil Res* 1995; **18**: 325–340.
- 105 Benony H, Daloz L, Bungener C, Chahraoui K, Frenay C, Auvin J. Emotional factors and subjective quality of life in subjects with spinal cord injuries. *Am J Phys Med Rehabil* 2002; **18**: 437–445.
- 106 Boschen K, Tonack M, Gargaro J. Long-term adjustment and community reintegration following spinal cord injury. *Int J Rehabil Res* 2003; **26**: 157–164.
- 107 Kishi Y, Robinson RG, Forrester AW. Prospective longitudinal study of depression following spinal cord injury. *J Neuropsychiatry* 1994; **6**: 2–9.
- 108 Hughes R, Swedlund N, Petersen N, Nosek MA. Depression and women with spinal cord injury. *Top Spinal Cord Inj Rehabil* 2001; **7**: 16–24.
- 109 McShane S, Karpand J. Employment following spinal cord injury: a covariance structure analysis. *Rehabil Psychol* 1993; **38**: 27–40.
- 110 Hanley M, Raichle K, Jensen M, Cardenas DD. Pain catastrophizing and beliefs predict changes in pain interference and psychological functioning in persons with spinal cord injury. *J Pain* 2008; **9**: 863–871.
- 111 Anzai K, Young J, McCallum J, Miller B, Jongbloed L. Factors influencing discharge location following high lesion spinal cord injury rehabilitation in British Columbia, Canada. *Spinal Cord* 2006; **44**: 11–18.

- 112 Elliott T, Godshall FJ, Herrick SM, Witty TE. Problem-solving appraisal and psychological adjustment following spinal cord injury. *Cogn Ther Res* 1991; **15**: 387–398.
- 113 Elliott T. Social problem-solving abilities and adjustment to recent-onset spinal cord injury. *Rehabil Psychol* 1999; **44**: 315–332.
- 114 Berry J, Elliott TR, Rivera P. Resilient, undercontrolled, and overcontrolled personality prototypes among persons with spinal cord injury. *J Pers Assess* 2007; **89**: 292–302.
- 115 Shanmugham K, Elliott TR, Palmatier A. Social problem solving abilities and psychosocial impairment among individuals recuperating from surgical repair for severe pressure sores. *Neurorehabilitation* 2004; **19**: 259–269.
- 116 Elliott T, Bush BA, Chen Y. Social problem-solving abilities predict pressure sore occurrence in the first 3 years of spinal cord injury. *Rehabil Psychol* 2006; **51**: 69–77.
- 117 Herrick S, Elliott TR, Crow F. Self-appraised problem-solving skills and the prediction of secondary complications among persons with spinal cord injuries. *J Clin Psychol Med S* 1994; **1**: 269–283.
- 118 Bloemen-Vrencken J, de Witte LP. Post-discharge nursing problems of spinal cord injured patients: on which fields can nurses contribute to rehabilitation? *Clin Rehabil* 2003; **17**: 890–898.
- 119 Dreer L, Elliott TR, Tucker E. Social problem-solving abilities and health behaviors among persons with recent-onset spinal cord injury. *J Clin Psychol Med S* 2004; **11**: 7–13.
- 120 Lee Y. Does self-monitoring influence the experience of leisure for individuals with spinal cord injury? *Annual Ther Recreat* 2008; **16**: 39–48.
- 121 Chase B, Cornille TA, English RW. Life satisfaction among persons with spinal cord injuries. *J Rehabil* 2000; **66**: 14–20.
- 122 MSKTC. <http://msktc.washington.edu/sci/findms.asp>. [cited 2010].
- 123 Post M, Brinkhof MWG, von Elm E, Boldt C, Brach M, Muff C et al. Design of the Swiss Spinal Cord Injury Cohort Study (SwiSCI). *Am J Phys Med Rehabil* [serial on the Internet]. 2010; submitted.
- 124 Paykel E. Life events, social support and depression. *Acta Psychiatr Scand* 1994; **377**: 50–58.
- 125 Munir S, Jackson DW. Social support, need for support, and anxiety among women graduate students. *Psychol Rep* 1997; **80**: 383–386.
- 126 Abrahamsen FERG, Pensgaard AM, Ronglan LT. Perceived ability and social support as mediators of achievement motivation and performance anxiety. *Scand J Med Sci Sports* 2008; **18**: 810–821.
- 127 Lazarus R, Folkman S. *Stress, Appraisal and Coping*. Springer: New York, 1984.
- 128 Folkman S, Lazarus RS. Coping as a mediator of emotion. *J Pers Soc Psychol* 1988; **54**: 466–475.
- 129 Thoits P. Social support as coping assistance. *J Consult Clin Psychol* 1986; **54**: 416–423.
- 130 Wonderlich-Tierney A, Vander Wal JS. The effects of social support and coping on the relationship between social anxiety and eating disorders. *Eat Behav* 2010; **11**: 85–91.
- 131 Mehnert A, Lehmann C, Graefen M, Huland H, Koch U. Depression, anxiety, post-traumatic stress disorder and health-related quality of life and its association with social support in ambulatory prostate cancer patients. *Eur J Cancer Care (Engl)* 2010; **19**: 736–745.
- 132 Koivula M, Paunonen-Ilmonen M, Tarkka MT, Tarkka M, Laippala P. Social support and its relation to fear and anxiety in patients awaiting coronary artery bypass grafting. *J Clin Nurs* 2002; **11**: 622–633.
- 133 Elliott T, Hurst M. Social problem solving and health. *Bienn Rev Couns Psychol* 2008; **1**: 295–309.
- 134 Gambrill E, Florian V, Splaver G. Assertion, loneliness and perceived control among students with and without physical disabilities. *Rehabil Couns Bull* 1986; **30**: 4–12.
- 135 Lopes P, Salovey P. Toward a broader education: social, emotional and practical skills. In: Zins J, Weissberg RP, Wang MC, Walberg HJ (eds). *Building Academic Success on Social and Emotional Learning: What Does the Research Say?*. Teachers College Press: New York, 2004, pp. 76–93.
- 136 Foster S, Bussman JR. Evidence-based approaches to social skills training with children and adolescents. In: Steele R, Elkin TD, Roberts MC (eds). *Handbook of Evidence-Based Therapies for Children and Adolescents: Bridging Science and Practice*. Springer Science + Business Media: New York, 2008, pp. 409–427.
- 137 Liberman R, Kopelowicz A, Silverstein SM. Psychiatric rehabilitation. In: Sadock B, Sadock VA (eds). *Comprehensive Textbook of Psychiatry*. Lippincott Williams & Wilkins: Baltimore, 2005 pp. 3884–3930.
- 138 Hersen M, Bellack AS, Himmelhoch JM. Treatment of unipolar depression with social skills training. *Behav Modif* 1980; **4**: 547–556.
- 139 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.
- 140 Dunn M, Van Horn E, Herman SH. Social skills and spinal cord injury: a comparison of three training procedures. *Behav Ther* 1989; **12**: 153–164.
- 141 Glueckauf R, Quittner AL. Assertiveness training for disabled adults in wheelchairs: self-report, role-play, and activity pattern outcomes. *J Consult Clin Psychol* 1992; **60**: 419–425.
- 142 Hogan B, Linden W, Najarian B. Social support intervention: do they work? *Clin Psychol Rev* 2002; **22**: 383–442.
- 143 Ullrich R, de Mynck R. Aufbau sozialer Kompetenz: Selbstsicherheitstraining, Assertivness-Training. In: Linden M, Hautzinger M (eds). *Verhaltenstherapiemanual*. Springer Medizin Verlag: Heidelberg, 2005.
- 144 Riggio R. The social skills inventory (SSI): measuring nonverbal and social skills. In: Manusov V (ed). *The Sourcebook of Nonverbal Measures: Going Beyond Words*. Lawrence Erlbaum Associates Publishers: Mahwah, 2005.
- 145 Meier J, Hope DA. Assessment of social skills. In: Bellack A (ed). *Behavioral Assessment*. Allyn and Bacon: Boston, 1998.
- 146 Derevensky J, Tsanos AP, Handman M. Children with cancer: an examination of their coping and adaptive behavior. *J Psychosoc Oncol* 1998; **16**: 37–61.
- 147 Gazzaniga M, Heatherton TF, Halpern D. *Psychological Science*. Norton and Company: New York, 2009.
- 148 Kiecolt-Glaser J, Newton TL. Marriage and health: his and hers. *Psychol Bull* 2001; **127**: 472–503.
- 149 Weitzenkamp D, Gerhart KA, Charlifue SW, Whiteneck GG. Spouses of spinal cord injured survivors: the added impact of caregiving. *Arch Phys Med Rehabil* 1997; **78**: 822–827.
- 150 Kester B, Rothblum ED, Lobato D, Milhous RL. Spouse adjustment to spinal cord injury: long-term medical and psychosocial factors. *Rehabil Couns Bull* 1988; **32**: 4–21.
- 151 Burg M, Seeman TE. Families and Health: the negative side of social ties. *Ann Behav Med* 1994; **16**: 109–115.
- 152 Fincham F, Linfield KJ. A new look at marital quality: can spouses feel positive and negative about their marriage? *J Fam Psychol* 1997; **11**: 489–502.
- 153 McNett SC. Social support, threat, and coping responses and effectiveness in the functionally disabled. *Nurs Res* 1987; **36**: 98–103.
- 154 WHO. *International Classification of Functioning, Disability and Health: ICF*. World Health Organization: Geneva, 2001.
- 155 Semrud-Clikeman M. *Social Competence in Children*. Springer Science + Business Media: New York, 2007.
- 156 Kasten H. *Soziale Kompetenzen, Entwicklungspsychologische Grundlagen und Frühpädagogische Konsequenzen*. Cornelsen Verlag Scriptor GmbH and Co. KG: Berlin Düsseldorf Mannheim, 2008.
- 157 Malti T, Perren S. *Soziale Kompetenzen bei Kindern und Jugendlichen, Entwicklungsprozesse und Förderungsmöglichkeiten*. Kohlhammer: Stuttgart, 2008.
- 158 Kelle U. Combining qualitative and quantitative methods in research practice: purposes and advantages. *Qual Res Psychol* 2006; **3**: 293–311.
- 159 Sitgreaves R. How large should the sample be? Statistical power and sample size. *Psychol Critiques* 1978; **23**: 151.
- 160 Medeiros L, Rosa DD, Bozzetti MC, Rosa MI, Edelweiss MI, Stein AT et al. Laparoscopy versus laparotomy for FIGO Stage I ovarian cancer. *Cochrane Database Systematic Review* 2008 Article no. CD005344.
- 161 Huynh J, Howard M, Lytwyn A. Self-collection for vaginal human papillomavirus testing: systematic review of studies asking women their perceptions. *J Low Genit Tract Dis* 2010; **14**: 356–362.
- 162 Orriols L, Salmi LR, Philip P, Moore N, Delorme B, Castot A et al. The impact of medicinal drugs on traffic safety: a systematic review of epidemiological studies. *Pharmacoepidemiol Drug Saf* 2009; **18**: 647–658.
- 163 Sanderson S, Tatt ID, Higgins JP. Tools for assessing quality and susceptibility to bias in observational studies in epidemiology: a systematic review and annotated bibliography. *Int J Epidemiol* 2007; **36**: 666–676.