



# The associations of acceptance with quality of life and mental health following spinal cord injury: a systematic review

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## Abstract

**Study design** Systematic review.

**Objectives** To identify, critically appraise, and synthesize research findings on the associations between acceptance, quality of life (QOL), and mental health outcomes in individuals living with spinal cord injury (SCI).

**Methods** Five databases (PubMed, PsycINFO, Embase, Web of Science, and Scopus) were systematically searched. Studies were included if they provided findings on the association between acceptance and QOL, mental health outcomes, or both in an SCI population aged 16 years or older. Only peer-reviewed original quantitative and qualitative studies were included. Screening, quality assessment, and data extraction were conducted independently by two researchers. Findings were tabulated and synthesized by outcome.

**Results** Forty-one studies were included. Greater acceptance was consistently associated with greater global and psychological QOL, life satisfaction, sense of well-being, mental health, and with lower levels of depression and anxiety. Inconsistent evidence was found with regards to social QOL and post-traumatic stress disorder. Acceptance was generally not associated with adjustment outcomes further than 2 years into the future. Study quality of the quantitative studies was mostly *fair* ( $n = 17$ ) followed by *good* ( $n = 13$ ), and *poor* ( $n = 9$ ).

**Conclusion** Health-care professionals may regard acceptance as a psychological resource they can aim to support in improving QOL and mental health following SCI. A range of methodological and conceptual limitations were present in the research. Future studies should prioritize longitudinal designs, consider dyadic effects, explore subjective meaning(s) of acceptance, and investigate the effectiveness of therapeutic approaches that stimulate the acceptance process.

## Introduction

A spinal cord injury (SCI) is a severe and chronic condition that is often accompanied by paralysis, numerous secondary

complications, functional impairments, and persistent pain [1]. This type of injury causes profound and irretrievable changes in many aspects of life [2] and has repeatedly been described as one of the most devastating injuries a person can experience [3, 4]. Individuals with SCI are faced with a myriad of daily challenges, including disruptions in work [5], family and social relationships [6], and community participation [7]. Furthermore, some individuals with SCI experience reduced satisfaction with life [8], poor social participation [9], and up to 30% report clinical levels of depression and anxiety at some point following their injury [10]. Hence, psychological distress is common in SCI and has been shown to persist up to 10 years or more post injury [11].

The presence and severity of negative psychological outcomes are influenced by many factors, including acceptance of the injury [12–14]. Acceptance is defined as perceiving the injury as an integral part of life going forward and a reevaluation of life values [15], and thus

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provides a coping strategy that is particularly relevant in unalterable situations [16]. Empirical studies show that greater acceptance is associated with greater quality of life (QOL) [17] and with lower levels of depression [13], anxiety [18], and post-traumatic stress disorder (PTSD) [19]. However, these empirical studies often focus more generally on psychological factors such as the global construct of coping, where acceptance is only incidentally included [13, 17–19]. This all-encompassing approach has some benefits, but it complicates the matter of getting a detailed overview of the specific role of acceptance in the adjustment process. This complication was highlighted in a previous systematic review from 2012 on psychological factors and QOL following SCI [4]. In this review acceptance was associated with lower levels of depression and anxiety as well as higher satisfaction with life, but due to the large-scale nature of their review, the authors recommended that future research provide more detailed insights into the factors that were consistently related to favorable adjustment outcomes [4]. However, a systematic review on the associations between acceptance, QOL, and mental health outcomes does not currently exist.

The aim of the present systematic review was to identify, critically appraise, and synthesize relevant research findings to answer the research question of how acceptance is associated with QOL and mental health outcomes in individuals living with SCI.

## Theoretical foundation

Over time, acceptance has been conceptualized in a variety of ways. Initially, stage-theory approaches of adjustment to SCI and other disabilities conceptualized acceptance as the result of successful progression through predefined stages such as denial, anger, bargaining, and depression [20]. However, these theories relied on clinical observations rather than empirical studies [21] and are generally not supported today [20]. Another cornerstone that continues to be a major influence is the seminal work of Wright [22]. Wright proposed a theory of disability acceptance as an adjustment of a person's value system. In this framework, acceptance entails that the perceived losses resulting from the disability do not devalue existing abilities or the person as a whole [22, 23]. While the theory of disability acceptance is still relevant today, in recent years most of the empirical researchers have turned their attention to the stress and coping literature [20]. The transactional model of stress and coping is based on the premise that psychological distress is caused by appraising a situation as exceeding the personal and situational resources needed to manage that situation [24]. In this framework, acceptance is proposed to reduce the discrepancy between what one prioritizes in life

and what one is capable of doing, thus reducing psychological distress [25]. One of the newest developments in this theoretical framework is the Spinal Cord Injury Adjustment Model (SCIAM) [20]. This is a dynamic, multivariate model of the adjustment process following SCI, which proposes that biological, psychological, and social factors all influence adjustment outcomes via appraisals and coping strategies.

In empirical studies, acceptance is generally conceptualized and measured in relation to two aspects: “accepting reality” and “value-change”. The *accepting reality* aspect focuses on an acknowledgement of reality as it is in the present moment, whereas the *value-change* aspect focuses on changing one's perspective and learning to appreciate new aspects of life [15].

## Methods

This systematic review was conducted and reported in accordance with the PRISIMA checklist [26], and a review protocol was registered in PROSPERO on January 29, 2019 (ID: CRD42019118644).

## Search strategy

A systematic literature search identified peer-reviewed publications exploring an association between acceptance and either QOL or mental health outcomes in individuals with SCI. On September 3, 2018 five databases (PubMed, PsycINFO, Embase, Web of Science, and Scopus) were systematically searched for eligible studies. An update search was performed on September 5, 2019 to identify studies published in the preceding year. All results and figures in this report include data from the updated search. The preliminary work consisted of pilot searches to ensure exhaustiveness of search terms and to identify appropriate Subject Headings and Medical Subject Headings (MeSH). These preliminary searches indicated that a search strategy focused on synonyms and related terms of SCI (e.g., spinal cord lesion) and acceptance (e.g., coping) would yield a manageable total sum of records. Therefore, no further specifiers were added. A final search algorithm was developed using Boolean logic operators (“AND” and “OR”). Search terms available as a subject heading or a MeSH term were searched both as such without explosion and as free text in title/abstract/keywords or similar. No restrictions were put on publication date. The search algorithm was performed as uniformly as possible across databases. The research librarians at University of Southern Denmark provided feedback on the search algorithm. The full electronic search algorithm in PsycINFO is provided in Supplementary Appendix 1 as an example.

## Eligibility criteria

Inclusion and exclusion criteria were developed prior to screening. Peer-reviewed original quantitative and qualitative research papers written in English, Danish, Norwegian, or Swedish were included, while reviews, doctoral dissertations, protocols, conference abstracts, and editorials were excluded. To be included, studies had to explore the association between acceptance and either QOL, mental health outcomes, or both among individuals with SCI aged 16 or older. Note that the *QOL* construct also comprised measures of life satisfaction and well-being, while *mental health* included measures of depression, anxiety, and PTSD. Studies focusing on narrower constructs such as hopelessness, functional independence, and social isolation, were not included. Furthermore, *acceptance* was conceptualized as either an acknowledgement of the permanence of the injury, as a reevaluation of life values, or a combination of the two. Studies were selected based on their use of standardized measures of acceptance, QOL, and mental health that have demonstrated adequate validity, such as the Spinal Cord Lesion-related Coping Strategies Questionnaire (SCL-CSQ) [15], the Coping Orientations to Problems Experienced (COPE) Inventory [16], the acceptance of disability scale (ADS) [27], World Health Organization Quality of Life Questionnaire [28], and Patient Health Questionnaire-9 [29]. Readers are encouraged to visit the SCIRE website at [www.scireproject.com](http://www.scireproject.com) for an easy-access description of many of the scales used in the included studies. Lastly, studies were excluded if they only dealt with inborn spinal cord conditions or disease entities, such as spinal cord infarction, myelitis, or spinal stenosis or if they only involved second analyses of a sample, but not adding new results to this review.

## Screening

All results from the searches were imported into EndNote, and duplicate records were identified and removed prior to screening. Next, all unique records were transferred to the online tool Covidence [30], and screened in title and abstracts according to the eligibility criteria (step 1). Records that could not be excluded based on title or abstract were full-text screened (step 2). At this step, reasons for exclusion were registered. The screening process was carried out by two raters independently, and disagreements between raters were discussed at each step. A third researcher was consulted when necessary.

## Quality assessment

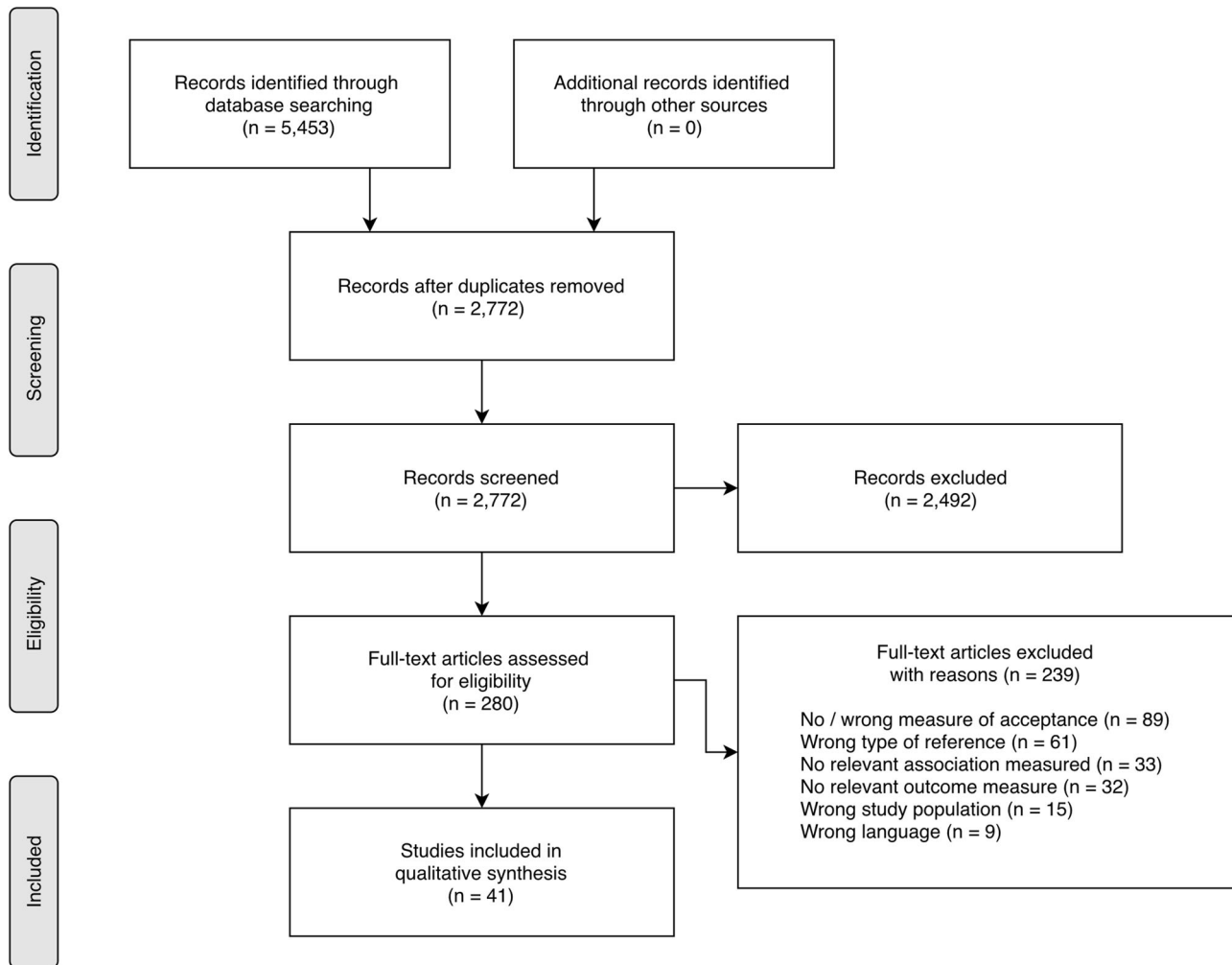
The U.S. National Institutes of Health's Quality Assessment Tool for Observational Cohort and Cross-Sectional

Studies (OCCSS) was used to appraise the quantitative studies [31] and the Critical Appraisal Skills Programme (CASP) was used to appraise the qualitative studies [32]. The OCCSS includes 14 criteria and has a final global rating scale of poor, fair, and good. Studies that were longitudinal or statistically controlled for confounders, or both, were given a quality rating of *good* unless there were other considerable methodological issues. Studies with a cross-sectional design that lacked any statistical control for confounders were given a quality rating of *fair*, unless there were considerable methodological issues (e.g., missing eligibility criteria or unclear sample population), in which case they were rated *poor*. The CASP includes ten questions that support a critical appraisal of qualitative evidence. It does not produce a final rating. Quality assessments were carried out independently by two raters. Disagreements were discussed, and a third researcher was consulted when necessary. Studies were not excluded based on their quality rating, and the studies were not weighted according to quality in the synthesis. Further, no analysis of quality across studies was conducted. Instead, study quality across studies (such as potential publication bias) was discussed at a general level.

## Data extraction and synthesis

Data extraction included sample characteristics (i.e., sample size, age, gender, type of injury, and time since injury), study country and setting, study design and time of measurement, the measure of acceptance, measure(s) of adjustment, and key findings of the study. Only findings relevant to address the research question were extracted. This information was tabulated. Data extraction was conducted independently by two raters. Disagreements were resolved by checking the original paper. The authors of the original paper were contacted in three instances to clarify ambiguous results. These results are marked with an asterisk in Table 1 containing the extracted data.

The data synthesis was done separately for cross sectional and longitudinal studies, and both followed the same three-step procedure: (1) direction and significance of correlations between acceptance and outcome, (2) the association between acceptance and an outcome in multiple regression analyses with control for potential confounding variables, and (3) any associations derived from other statistical methodologies (e.g., cluster analysis, latent growth mixture modeling, or qualitative findings). The synthesis was organized according to the psychological correlates examined in the individual studies. These were (1) global and specific domains of QOL, (2) well-being, (3) satisfaction with life, (4) mental health, (5) depression, (6) anxiety, and (7) PTSD.



**Fig. 1** PRISMA Flowchart of the systematic search and screening process, including reasons for exclusion. Final search was performed on September 5, 2019

## Results

### Systematic search results

The search retrieved 2772 unique records, of which 2492 were excluded in title and abstract screening, and 239 excluded in full-text screening. Thus, 41 studies were included in this review (see Fig.1). There were 39 quantitative studies and two qualitative ones.

### Study characteristics of the included studies

Most studies were cross-sectional ( $n = 30$ ) with sample sizes between 12 and 511. All studies had a majority of male participants, and the mean age ranged from 30 to 63 years. Mean time since injury varied extensively from 6 weeks post injury to 24 years post injury. The majority of studies were conducted in western developed countries. Six scales were used to measure acceptance (see Table 1) with

the three most used being the SCL-CSQ [15] ( $n = 23$ ), the COPE [16] ( $n = 6$ ), and the ADS [27] ( $n = 6$ ). The included studies explored associations between acceptance and global and specific domains of QOL ( $n = 19$ ), satisfaction with life ( $n = 4$ ), well-being ( $n = 4$ ), mental health ( $n = 1$ ), depression ( $n = 26$ ), anxiety ( $n = 18$ ), and PTSD ( $n = 2$ ). Many studies explored more than one of these associations.

### Study quality

Of the 39 quantitative studies, nine studies received a study quality rating of *poor*, 17 a rating of *fair*, and 13 a rating of *good*. Recurrent quality issues were a lack of longitudinal study designs, a lack of statistical control for confounders, poorly defined study populations, and low participation rates. A summary of the ratings and main issues of each study is provided in Supplementary Appendix 2. Quality assessment of the qualitative studies revealed appropriate research designs and data collection for both studies, but an inappropriate

**Table 1** Sample size and demographics, injury-related characteristics, study design, measurement scale of acceptance and outcome, and the key findings of included studies

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>b</sup>	Key findings of the study <sup>c</sup>
Anderson et al. [53]	n = 259	M = 30 years range: 24–42 Women: 38%	USA and Canada. Individuals with SCI living in the community post discharge from SCI care program.	58% tetraplegia, 42% paraplegia. Time since injury not reported.	Cross sectional Assessment time: minimum 3 years post discharge.	Brief Coping Orientations to Problems Experienced (Brief COPE)	Life satisfaction; Life Scale	Acceptance was a significant unique predictor of satisfaction with life ( $\beta = 1.186, p = 0.004$ ) in a multiple linear regression model. Acceptance accounted for 51% of the variance in life satisfaction along with three other coping strategies (emotional support, religion, and substance abuse), age at interview, marriage status, perceived health, and occupation status. Coping strategies were added in the second step and explained an additional 10% of the variance in life satisfaction compared with age at interview, marriage status, perceived health, and occupation status alone.
Berry et al. [57]	n = 199	M = 40.5 years (SD = 16.7) Women: 33.7%	USA. Inpatient medical rehabilitation with referral for psychological assessment as part of the rehabilitation program.	33.7% complete, 63.3% incomplete. Time since injury = 73 weeks (range: 1–2600), within 3 months.	Longitudinal T1: Admission T2: Discharge—mostly within 3 months.	Acceptance of Disability Scale	Depression: The Inventory to Diagnose Depression	Acceptance at discharge was negatively correlated with depression at admission ( $r = -0.30, p < 0.01$ ).
Bonanno et al. [49]	n = 233	Mean age not reported. Range: 16–83 Women: 21.9%	Great Britain, Switzerland, Sweden, Germany, Ireland, and Austria. Spinal Centers.	Type of injury not reported.	Longitudinal T1: 0–6 months post injury T2: 3 months post injury T3: 1 year post injury T4: 2 years post injury.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale	Depression: Acceptance was a significant predictor of trajectories of depression over a 2-year period. Specifically, acceptance was a significant predictor of class membership for stable low depression compared with chronic depression (OR = -3.06, $p < 0.05$ ), and for depression improvement compared with chronic depression (OR = 1.94, $p < 0.05$ ). Anxiety: Acceptance was a significant predictor of class membership for stable low anxiety compared with anxiety improvement (OR = -1.90, $p < 0.01$ ), and for stable low anxiety compared with delayed anxiety (OR = -2.23, $p < 0.05$ ).
Carvalho et al. [58]	n = 65	M = 38.8 years (SD = 17.1) Women: 26.2%	Portugal. Adults with SCI in inpatient rehabilitation.	36.6% Cervical, 46.2% Dorsal, 17.5% Lumbar. Time since injury not reported.	Cross sectional that the study was longitudinal, but the only relevant data for this review was cross sectional. Assessment time: 0–6 weeks from admission.	Coping Assessment Scale	Depression and anxiety: Symptom Checklist 90—Revised.	Acceptance was negatively correlated with depression ( $r = -0.26, p < 0.05$ ). There was no reported correlation between acceptance and anxiety.
Catalano et al. [52]	n = 413	M = 46.4 years (SD = 14.1) Women: 29%	Canada Community sample with members of patient association.	Type of injury not reported. Time since injury = 2.44 years (SD = 1.21)	Cross sectional.	Acceptance of injury disability scale	Well-being: the sense of well-being inventory	Acceptance correlated positively with financial well-being ( $r = 0.37, p < 0.01$ ), psychological well-being ( $r = 0.59, p < 0.01$ ), social and family well-being ( $r = 0.44, p < 0.01$ ), and physical well-being ( $r = 0.50, p < 0.01$ ).
DeRoon-Cassini et al. [51]	n = 79	M = 56.3 years (SD = 10.9) Women: 4%	USA. Veteran Affairs facility at an SCI medical center.	Type of injury not reported. Time since injury not reported.	Cross sectional mixed methods (qualitative interviews including both open-ended questions and clinical measures).	Acceptance of injury emerged as a theme in a Grounded Theory approach as coming to peace with one's situation.	PTSD: The PTSD Checklist—Civilian Version. Depression: The Zung Self-Rating Depression Scale. Well-being: Sense of Well-Being Inventory.	Acceptance was not significantly associated with PTSD, depression, nor well-being.
Eilfsröm et al. [42]	n = 132	M = 43.1 years (SD = 15.1) Women: 23%	Sweden. Community sample with individuals who had previously received rehabilitation at SCI center.	47% tetraplegia, 53% paraplegia 68% Complete 32% Incomplete. Time since injury = 9.0 years (SD = 6.2).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Health-related QOL: Short-Form-36 Health Survey SCI-specific QOL: The Spinal Cord Injury Quality of Life Questionnaire	No specific values were reported. The authors stated that acceptance correlated significantly with both health-related and SCI-specific QOL scores.
Eilfsröm et al. [25]	n = 355	M = 49.0 years (SD = 12.0) Women: 20.8%	Austria, Germany, Switzerland, and United Kingdom. Community residing individuals with SCI.	41.1% Cervical, 43.7% Thoracic, 6.5% Lumbar, 0.3% Sacral, 8.2% Missing. Time since injury = 21.0 years (SD = 11.2).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance was strongly, negatively correlated with depression ( $r = -0.58, p < 0.01$ ). Further, acceptance was moderately, negatively correlated with anxiety ( $r = -0.45, p < 0.01$ ). The scores ranged from $r = -0.40$ to $r = -0.68$ across study countries for depression, and from $r = -0.28$ to $r = -0.50$ for anxiety.

**Table 1** (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Elfröm et al. [12]	n = 181	M = 44.4 years (SD = 16.1) Women: 24.3%	Sweden. Community sample with individuals who had previously received rehabilitation at SCI center.	32% complete tetraplegia, 34% complete paraplegia, 34% incomplete. Time since injury = 9.3 years (SD = 7.2).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire.	Global QOL: A single standardized question from the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30.	Acceptance was a significant unique predictor of health-related QOL ( $\beta = 0.45, p < 0.001$ ) when controlling for the effect of the other coping strategies from the Spinal Cord Lesion-related Coping Strategies Questionnaire, the Ways of Coping Questionnaire, and social support. Background variables were not controlled for as none of them correlated with the single item of health-related QOL.
Elfröm et al. [17]	n = 256	M = 43.9 years (SD = 15.9) Women: 25.4%	Sweden. Community sample with individuals who had previously received rehabilitation at SCI center.	32.8% complete tetraplegia, 33.6% complete paraplegia, 33.2% incomplete. Time since injury = 6.9 years (SD = 7.0).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire.	SCI-specific QOL: The Spinal Cord Injury Quality of Life Questionnaire Health-related QOL: Short Form-36 Health Survey version 2.0 Global QOL: A single standardized question from the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30.	A series of multiple linear regression analyses were performed with sociodemographic variables (gender, educational level, and marital status), injury-related variables (age at lesion, duration of disability and neurological classification), social support, and coping strategies entered as independent variables. SCI-specific QOL: Acceptance was a significant unique predictor of all three subscales: problems regarding injury ( $\beta = -0.43, p < 0.001$ ), physical/social functioning ( $\beta = -0.24, p < 0.001$ ), and depressive feelings ( $\beta = -0.37, p < 0.001$ ). Health-related QOL: Acceptance was a significant predictor of all eight subscales: physical functioning ( $\beta = 0.16, p < 0.01$ ), role functioning - physical ( $\beta = 0.27, p < 0.001$ ), bodily pain ( $\beta = 0.23, p < 0.001$ ), general health ( $\beta = 0.30, p < 0.001$ ), vitality ( $\beta = 0.33, p < 0.001$ ), social functioning ( $\beta = 0.40, p < 0.001$ ), role functioning - emotional ( $\beta = 0.28, p < 0.001$ ), and mental health ( $\beta = 0.38, p < 0.001$ ). Global QOL: Acceptance was a significant predictor of overall QOL ( $\beta = 0.38, p < 0.001$ ).
Elliott et al. [59]	n = 109	M = 32.7 years (SD = 13.0) Women: 27.5%	USA. Individuals with SCI in inpatient rehabilitation.	38% tetraplegia, 53% paraplegia, 9% other. Max. 1 year post injury.	Longitudinal. T1: Admission T2: Discharge	Acceptance of Disability Scale	Depression: The Inventory to Diagnose Depression	Acceptance at discharge was negatively correlated with depression at admission ( $r = -0.52, p < 0.05$ ). <sup>a</sup> Further, greater depression at admission predicted acceptance at discharge in a regression model with injury level, type of injury, and goal instability ( $\beta = -0.51, p < .05$ ).
Ferdiana et al. [43]	n = 12	Median = 35.7 Women: 33.3%	Indonesia. Individuals with SCI from a vocational rehabilitation center.	100% paraplegia, 91.7% complete, 8.3% incomplete.	Qualitative semi-structured interview study at one time point.	Acceptance of injury emerged as a theme in a Thematic analysis.	QOL and life satisfaction as these terms were conceptualized by the participants themselves.	Thirteen components of QOL were identified and grouped into five domains, including participation, social support and relationships, independence, relationship with God, and psychological resources. Within the domain of psychological resources, acceptance emerged as an important component to begin with. In a quote, a participant states that by accepting the SCI, you will know what you can do and what you cannot do.
Ferrin et al. [44]	n = 161	M = 46.9 years (SD = 15.5) Women: 23%	Canada. Community sample with members of patient association.	Type of injury not reported. Time since injury = 1.4 years (SD = 1.0)	Cross sectional	Multidimensional Acceptance of Loss Scale	QOL: World Health Organization Quality of Life - Brief Version	Cluster Analysis was used to create homogenous groups based on acceptance. ANOVA with post-hoc comparisons showed that individuals with high compared with medium or low acceptance had significantly higher physical and social QOL. Further, individuals with high or medium versus low acceptance had significantly higher psychological QOL. Finally, individuals with high acceptance versus low acceptance had significantly higher QOL in the environmental domain. No statistics were reported.

Table 1 (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury* and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Jiao et al. [60]	n = 100	M = 37.7 years (SD = 11.8) Gender not reported	China. In and outpatients from a vocational rehabilitation center.	Type of injury not reported. Time since injury not reported.	Cross sectional.	Acceptance of Disability Scale	Depression: Center for Epidemiologic Studies Short Depression Scale	Firstly, the depressed group scored significantly lower on acceptance compared with the non-depressed group ( $t = 4.59, p < 0.01$ ). Further, acceptance was negatively correlated with depression ( $r = -0.57, p < 0.01$ ). Multiple linear regression showed depression to be significantly associated with acceptance over and above what was explained by age, gender, education, and social support ( $\beta = -0.48, p < 0.01$ ). Another regression analysis with only depression and social support in the model also showed a significant contribution of depression on explaining variance in acceptance ( $\beta = -0.56, p < 0.01$ ). The later regression model was used to show that depression mediated the relationship between social support and acceptance.
Jørgensen et al. [61]	n = 122	M = 63.0 years (SD = 9.0) Women: 29.5%	Sweden. Community sample recruited through databases in SCI units.	17.2% complete tetraplegia, 33.6% complete paraplegia, 49.2% incomplete. Time since injury = 24.0 years (SD = 12.0).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression: Geriatric Depression Scale	Multiple linear regression showed higher acceptance to be significantly associated with lower depression over and above what was explained by secondary health conditions (e.g., spasticity, neuropathic pain), sense of coherence, other coping strategies, and leisure-time physical activity ( $\beta = -0.29, p < 0.001$ ). Correlational analyses showed that acceptance was strongly negatively correlated with both depression ( $r = -0.56, p < 0.001$ ) and anxiety ( $r = -0.63, p < 0.001$ ) at 6 weeks post injury as well as strongly with depression ( $r = -0.58, p < 0.01$ ) and moderately with anxiety ( $r = -0.45, p < 0.05$ ) at 4–7 years post injury. Further, stepwise multiple regression analyses of the combined data showed that acceptance was a unique predictor of depression ( $\beta = -0.39, p < 0.01$ ) together with behavioral disengagement and was the only significant predictor of anxiety ( $\beta = -0.54, p < 0.001$ ). The regression models all COPE strategies, functional independence, marital satisfaction, and group membership as independent variables.
Kennedy et al. [62]	Group 1: n = 41 Group 2: n = 30	Mean age not reported Women: Group 1: 17.1% Group 2: 38.7%	United Kingdom. Group 1: Hospital inpatients at a SCI rehabilitation center. Group 2: Community residing individuals at least 3-years post discharge from rehabilitation center.	Group 1: 46.3% tetraplegia, 53.7% paraplegia Group 2: 56.7% tetraplegia, 43.3% paraplegia. Time since injury: Group 1: 6 weeks post injury Group 2: 4–7 years post injury (Mean = 5.5 years)	Cross sectional.	Coping Orientations to Problems Experienced (COPE)	Depression: Beck Depression Inventory Anxiety: State Anxiety Inventory	At 12 weeks post injury acceptance was negatively correlated with depression ( $r = -0.39, p < 0.001$ ) and anxiety ( $r = -0.46, p < 0.001$ ). Similar correlations were found at other time points, but only these specific results were reported. Stepwise regression analyses were conducted in which the coping strategies and functional independence were entered as independent variables. Acceptance was a significant predictor of depression at 6 weeks post injury ( $\beta = -1.10, p < 0.001$ ), 12 weeks post injury ( $\beta = -0.80, p < 0.001$ ), and 1 month post discharge ( $\beta = -0.68, p < 0.001$ ) but did not predict depression at 24 weeks post injury or 1 year post-injury. Acceptance was a significant predictor of anxiety at six ( $\beta = -1.40, p < 0.001$ ), and 12 weeks post injury ( $\beta = -1.40, p < 0.001$ ) but did not predict anxiety beyond that point. Lastly, acceptance at both 6 weeks post injury ( $\beta = -0.20, p < 0.001$ ) and at 12 weeks post injury ( $\beta = -0.80, p < 0.05$ ) were significant unique predictors of depression at 1 year post discharge. Anxiety 1 year post discharge was not predicted by any previous score of acceptance.
Kennedy et al. [13]	n = 87	Mean age not reported Women: 19%	United Kingdom. Individuals with SCI from onset of injury to community placement.	68% paraplegia 32% tetraplegia.	Longitudinal. Post injury: T1: 6 weeks T2: 12 weeks T3: 18 weeks T4: 24 weeks Post discharge: T5: 1 month T6: 3 months T7: 6 months T8: 1 year T9: 2 years	Coping Orientations to Problems Experienced (COPE)	Depression: Beck Depression Inventory Anxiety: State Anxiety Inventory	At 12 weeks post injury acceptance was negatively correlated with depression ( $r = -0.39, p < 0.001$ ) and anxiety ( $r = -0.46, p < 0.001$ ). Similar correlations were found at other time points, but only these specific results were reported. Stepwise regression analyses were conducted in which the coping strategies and functional independence were entered as independent variables. Acceptance was a significant predictor of depression at 6 weeks post injury ( $\beta = -1.10, p < 0.001$ ), 12 weeks post injury ( $\beta = -0.80, p < 0.001$ ), and 1 month post discharge ( $\beta = -0.68, p < 0.001$ ) but did not predict depression at 24 weeks post injury or 1 year post-injury. Acceptance was a significant predictor of anxiety at six ( $\beta = -1.40, p < 0.001$ ), and 12 weeks post injury ( $\beta = -1.40, p < 0.001$ ) but did not predict anxiety beyond that point. Lastly, acceptance at both 6 weeks post injury ( $\beta = -0.20, p < 0.001$ ) and at 12 weeks post injury ( $\beta = -0.80, p < 0.05$ ) were significant unique predictors of depression at 1 year post discharge. Anxiety 1 year post discharge was not predicted by any previous score of acceptance.

**Table 1** (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Kennedy et al. [63]	n = 54	Median = 31 years Women: 20%	United Kingdom. Inpatients at a SCI rehabilitation center.	50% paraplegia, 50% tetraplegia. Time since injury = 25 weeks.	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance was negatively correlated with depression ( $r = -0.46, p < 0.01$ ) while the negative correlation between acceptance and anxiety was not statistically significant. Acceptance was not a significant predictor of neither depression nor anxiety with the control for sociodemographic variables, injury-related factors, rehabilitation characteristics, social reliance, and fighting spirit.
Kennedy et al. [46]	n = 266	M = 37.5 years (SD = 14.6) Women: 21.8%	United Kingdom, Switzerland, Germany, and Ireland. Inpatients at selected SCI rehabilitation centers from the above countries.	31% complete paraplegia, 23% incomplete paraplegia, 18% complete tetraplegia, 28% incomplete tetraplegia.	Longitudinal: Please note that coping strategies and outcomes were all measured at 12 weeks post injury.	Spinal Cord Lesion-related Coping Strategies Questionnaire	World Health Organization Quality of Life – Brief Version Depression and anxiety: Hospital Anxiety and Depression Scale	A series of hierarchical regression analyses were conducted in which injury and demographic variables were entered in step one, perceived manageability, sense of coherence, and appraisal measures in step 2, and coping measures in step 3. The outcome variables were anxiety, depression, physical QOL, and psychological QOL, respectively. Acceptance only contributed significantly to the model predicting depression ( $\beta = -0.22, p < 0.001$ ), while it was not a unique predictor of anxiety nor any of the QOL domains.
Kennedy et al. [45]	n = 237 <i>Significant overlap with Kennedy et al. [46]</i>	M = 38.2 years Women: 21.1%	United Kingdom, Ireland, Austria, and Sweden. Inpatients at selected SCI rehabilitation centers from the above countries.	31.5% complete paraplegia, 22.1% incomplete paraplegia, 17.4% complete tetraplegia, 28.9% incomplete tetraplegia.	Longitudinal T1: 12 weeks post injury T2: 1 year post injury.	Spinal Cord Lesion-related Coping Strategies Questionnaire	World Health Organization Quality of Life – Brief Version Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance at 12 weeks post injury was significantly correlated with less depression ( $r = -0.49, p < 0.0001$ ) and anxiety ( $r = -0.41, p < 0.001$ ), and with greater psychological QOL ( $r = 0.65, p < 0.0001$ ) at 1 year post injury. At 1 year post injury, greater acceptance correlated strongly with lower depression ( $r = -0.71, p < 0.05$ ), lower anxiety ( $r = -0.43, p < 0.05$ ), and greater psychological QOL ( $r = 0.65, p < 0.05$ ). Hierarchical stepwise regression analyses predicting depression, anxiety, and psychological QOL at 1 year post injury were conducted. Age, gender, and level of injury were entered in the first step, sense of coherence in the second step, appraisals in the third step, and coping strategies in the fourth and final step. Acceptance made a significant contribution to the final models predicting depression ( $\beta = -0.37$ ), and psychological QOL ( $\beta = 0.34$ ), but not anxiety. Specific $p$ values were not reported.
Kennedy et al. [64]	n = 127	M = 39.3 years (SD = 13.5) Women: 20.5%	United Kingdom, Germany, Switzerland, and Ireland. Inpatients from selected SCI rehabilitation centers to community placement.	38% complete paraplegia, 19% incomplete paraplegia, 17% complete tetraplegia, 26% incomplete tetraplegia.	Longitudinal T1: 12 weeks post injury T2: 1 year post injury	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance at 12 weeks post injury was significantly correlated with depression scores at 1 year post injury ( $r = -0.46, p < 0.001$ ). No results regarding anxiety were reported.
Kennedy et al. [47]	n = 25	M = 35.6 years (SD = 13.5) Women: 28%	Ireland. Inpatients at SCI center following acute SCI.	12% complete paraplegia, 64% incomplete paraplegia, 16% complete tetraplegia, 8% incomplete tetraplegia.	Cross sectional. Assessment time: Approx. 12 weeks post injury.	Spinal Cord Lesion-related Coping Strategies Questionnaire	World Health Organization Quality of Life – Brief Version Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance was significantly positively correlated with physical QOL ( $r = 0.53, p < 0.01$ ), psychological QOL ( $r = 0.79, p < 0.0001$ ), and environmental QOL ( $r = 0.46, p < 0.05$ ), while being negatively correlated with depression ( $r = -0.59, p < 0.01$ ). Acceptance was not significantly correlated with anxiety nor social QOL ( $p > 0.05$ ). There were significant differences between individuals who had scored high on acceptance and those who had scored low. High acceptance was associated with significantly greater physical QOL ( $t = 2.53, p < 0.05$ ), psychological QOL ( $t = 3.76, p < 0.0001$ ), and environmental QOL ( $t = 2.27, p < 0.05$ ), and had lower depression scores ( $t = 0.10, p < 0.01$ ).



Table 1 (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Kennedy et al. [18]	n = 232 at baseline follow-up n = 144 Significant overlap with Kennedy et al. [46]	M = 40.0 years Women: 20.7%	United Kingdom, Switzerland, Germany, and Ireland Inpatients from selected SCI rehabilitation centers to community placement.	32% complete paraplegia, 20.8% incomplete paraplegia, 19.8% complete tetraplegia, 27.4% incomplete tetraplegia.	Longitudinal. T1: 12 weeks post injury T2: 1 year post injury T3: 2 years post injury	Spinal Cord Lesion-related Coping Strategies Questionnaire	QOL: World Health Organization Quality of Life - Brief Version SCI-specific QOL: The Spinal Cord Injury Quality of Life Questionnaire Depression and anxiety: Hospital Anxiety and Depression Scale	Acceptance at 12 weeks post injury was found to correlate positively with psychological QOL ( $r = 0.35$ , $p < 0.001$ ) and negatively with the SCI-specific QOL domain of problems regarding injury ( $r = -0.36$ , $p < 0.0001$ ). 2 years post injury while results were nonsignificant for all other QOL domains (physical, social, environmental, physical/social functioning). Acceptance at 12 weeks post injury was also found to be negatively correlated with depression ( $r = -0.42$ , $p < 0.001$ ) and anxiety ( $r = -0.28$ , $p < 0.01$ ) 2 years post injury. Acceptance at 12 weeks post injury was not a significant predictor of any QOL domains, depression nor anxiety at 2 years post injury when gender, age, injury type, sense of coherence, perceived manageability, appraisals, and other coping strategies were controlled for. Forward stepwise multiple regression was conducted with depression at 21-plus years post injury as the dependent variable and acceptance, active coping, positive reinterpretation, behavioral disengagement, and substance abuse ideation at 12 weeks post injury as independent variables. Only positive reinterpretation was a significant predictor in the final model. As such, acceptance at 12 weeks post injury was not predictive of depression at 21-plus years post injury.
Kennedy et al. [65]	n = 22 Recruited from the Kennedy et al. [13] cohort	Mean age not reported. Women: 13.6%	United Kingdom. Community residing individuals with SCI.	40.9% cervical, 36.4% thoracic, 22.7% lumbar. Time since injury = 23.1 years range: 21–24.	Longitudinal. T1: 12 weeks post injury T2: 21-plus years post injury.	Coping Orientations to Problems Experienced (COPE)	Depression: Beck Depression Inventory	Acceptance correlated negatively with emotional stability ( $r = -0.23$ , $p < 0.05$ ). No significant correlations were observed between acceptance and the other domains of quality of life.
Khodayarian et al. [48]	n = 102	Mean age not reported. Women: 29.4%	Iran Community residing individuals with SCI in a specific province.	14.7% incomplete paraplegia, 70.6% complete paraplegia, 14.7% complete tetraplegia not reported.	Cross sectional	Spinal Cord Lesion-related Coping Strategies Questionnaire	QOL: Sickness Impact Profile.	Acceptance correlated negatively with emotional stability ( $r = -0.23$ , $p < 0.05$ ). No significant correlations were observed between acceptance and the other domains of quality of life.
Lude et al. [19]	n = 156	Mean age not reported. Women: 23%	United Kingdom, Switzerland, and Germany. Inpatients at selected SCI rehabilitation centers.	63% paraplegia, 37% tetraplegia, 58% complete, 42% incomplete. Time since injury not reported.	Cross sectional. Assessment time: 6 months post injury.	Coping Orientations to Problems Experienced (COPE)	PTSD: Impact of Event Scale	Greater acceptance correlated significantly with lower total scores of post-traumatic distress as measured by the IES ( $p < 0.01$ ). No $r$ was reported. Further, stepwise multiple regression analyses were conducted with sociodemographic variables (gender, age), injury (level, completeness, time since injury), study country, and coping strategies as independent variables. The dependent variables were the subscales of the Impact of Event Scale: Intrusion and avoidance at 6 months post injury. Acceptance was a significant predictor of intrusion ( $\beta = -0.27$ , $p < 0.001$ ) but not of avoidance.
Mighorini et al. [33]	n = 443	M = 51.8 years (range = 18–86) Women: 22%	Australia. Community residing individuals with SCI derived from a hospital database.	33.6% incomplete paraplegia, 30.7% complete paraplegia, 25.3% incomplete tetraplegia, 10.2% complete tetraplegia. Time since injury = 19.2 years (range = 1–66).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	QOL: Comprehensive Quality of Life for Adults, version 5 (only 'Satisfaction with health' subscale) Depression and anxiety: Depression, Anxiety, and Stress Scale—short version	Greater acceptance was correlated with lower depression (Spearman's $\rho = -0.45$ ) and anxiety ( $\rho = -0.24$ ), and with greater subjective QOL ( $\rho = 0.55$ ). However, no $p$ values were reported. Further, logistic regression analyses were conducted to examine the associations between coping strategies and outcomes while keeping gender, age, level of and time since injury, marital status, household income, health, and emotional consequences constant. Acceptance was a significant predictor of a high subjective QOL (OR = 3.43, $p < 0.001$ ), but it did not significantly predict neither depression nor anxiety.

**Table 1** (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Migliorini et al. [10]	Same sample as Migliorini et al. [33]	Same sample as Migliorini et al. [33].	Same sample as Migliorini et al. [33].	Same sample as Migliorini et al. [33].	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Comprehensive Quality of Life for Adults, version 5 (only 'Satisfaction with health' subscale)	Reported the same correlations as Migliorini et al. [33] and conducted a similar logistic regression analysis with a few minor changes. Here, household income was not included in the model, while objective QOL domains and presence of psychopathology were included as predictors. In this regression model, acceptance was a significant predictor of a high subjective QOL (OR = 3.46, $p = 0.001$ ).
Migliorini et al. [35]	Same sample as Migliorini et al. [33]	Same sample as Migliorini et al. [33].	Same sample as Migliorini et al. [33].	Same sample as Migliorini et al. [33].	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Two subscales of the Comprehensive Quality of Life for Adults, version 5: 'Satisfaction with health' and 'Objective material QOL'.	Acceptance was a significant predictor in linear regression model with satisfaction with health as dependent variable ( $\beta = 0.36, p < 0.001$ and age, gender, marital status, health etiology, and completeness of injury as independent variables. Results were nonsignificant for same model with objective material QOL as dependent variable.
Miller et al. [36]	$n = 161$	$M = 46.9$ years (SD = 15.5). Women: 23%	Canada. Community sample of members of a Canadian SCI association.	Type of injury not reported. Time since injury = 16.7 months (SD = 12.5).	Cross sectional.	Acceptance of Disability Scale	QOL: World Health Organization Quality of Life—Brief Version	Acceptance was positively correlated with the physical ( $r = 0.72, p < 0.01$ ), psychological ( $r = 0.51, p < 0.01$ ), and environmental QOL domains ( $r = 0.46, p < 0.05$ ). It was not significantly associated with the social QOL domain.
Nicholls et al. [66]	$n = 40$	$M = 34.8$ years (SD = 11.0). Women: 7.5%	Colombia. Community sample of individuals with SCI applying for services at a non-profit organization.	55% paraplegia, 45% tetraplegia. Time since injury = 11.9 years (SD = 8.7).	Cross sectional.	Acceptance of Disability Scale	Depression: Patient Health Questionnaire-9	Greater acceptance was significantly associated with lower depression ( $r = -0.48, p = 0.002$ ). <sup>b</sup> Further, in a multiple linear regression model with acceptance as the dependent variable and gender, time since injury, and depression as independent variables, lower depression was significantly associated with higher acceptance ( $B = -2.47, p = 0.006$ ).
Paker et al. [67]	$n = 100$	$M = 40.8$ years (SD = 16.1). Women: 26%	Turkey. Inpatients at a single SCI rehabilitation center.	74% paraplegia, 26% tetraplegia, 40% complete, 60% incomplete. Time since injury = 2.4 years (SD = 3.7).	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale	Greater acceptance was related to less emotional distress (depression and anxiety), but the results were not significant. The authors do not provide specific results from the correlation analysis.
Perry et al. [38]	$n = 47$	$M = 39.8$ years (SD = 15.2). Women: 17%	Australia. Inpatients at an SCI rehabilitation center (2004–2006).	51% paraplegia, 49% tetraplegia, 45% complete, 55% incomplete. Time since injury not reported.	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale Health-related QOL: Short Form-12 Health Survey	Greater acceptance was associated with greater QOL in both the mental component ( $r = 0.13$ ) and the physical component ( $r = 0.19$ ). Acceptance was also correlated with lower levels of anxiety ( $r = -0.37$ ) and depression ( $r = -0.45$ ). Only the correlation between acceptance and depression was reported to be statistically significant at a $p < 0.006$ level. The $p$ values for the other correlations were not reported.
Perry et al. [37]	$n = 45$	$M = 46.0$ years (SD = 16). Women: 16%	Australia. Outpatients attending a pain management center (2005–2007).	58% paraplegia, 31% tetraplegia, 44% complete, 51% incomplete due to missings. Time since injury = 7.8 years (range: 0.3–32.4)	Cross sectional.	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale Health-related QOL: Short Form-12 Health Survey	Due to the required $p$ level being set at 0.005, acceptance was only significantly correlated with depression ( $r = -0.78, p < 0.001$ ). The correlations with QOL and anxiety were not statistically significant at the $p < 0.005$ level.
Pollard and Kennedy [11]	$n = 37$	$M = 40.9$ years (SD = 19). Women: 19%	United Kingdom. Community sample (cohort followed from admission to SCI rehabilitation center).	59% paraplegia, 41% tetraplegia, 73% complete, 27% incomplete. Time since injury = 9.9 years (range: 8–11).	Longitudinal 10 year follow-up on Kennedy et al. [13]	Coping Orientations to Problems Experienced (COPE)	Depression: Beck Depression Inventory Anxiety: State Anxiety Inventory	Acceptance did not significantly correlate with depression or anxiety. No statistics were reported. Two multiple regression analyses were conducted with either depression or anxiety at 10 years post injury as dependent variables and coping subscales at 12 weeks post injury as predictors. Acceptance did not contribute significantly to these models.

Table 1 (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury* and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Salfari et al. [39]	n = 220	M = 58.2 years (SD = 10.3) Women: 25.5%	Iran. Individuals with SCI referred to a neurology center.	25.4% incomplete paraplegia, 38.2% complete paraplegia, 21.4% incomplete tetraplegia, 15.0% complete tetraplegia Time since injury = 4.25 years (SD = 2.09)	Cross sectional	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale Health-related QOL: Short Form-12 Health Survey	Acceptance was positively correlated with both mental and physical components of QOL, and negatively with anxiety and depression. Specific results were not reported. Four multiple linear regression analyses were conducted with physical QOL, mental QOL, anxiety, and depression as dependent variables. The authors do not report which variables were entered as independent variables, but the table of results show that age, gender, cause of injury, etiology of injury, time since injury, physical functioning, acceptance, fighting spirit, and social reliance were included. Acceptance contributed significantly in explaining variance in mental QOL ( $\beta = 0.22, p < 0.001$ ) and anxiety ( $\beta = -0.33, p < 0.001$ ). Acceptance did not contribute significantly to explain the variance in physical QOL or depression. Greater acceptance was significantly correlated with greater global QOL ( $r = 0.48, p < 0.01$ ), physical QOL ( $r = 0.38, p < 0.01$ ), psychological QOL ( $r = 0.55, p < 0.01$ ), social QOL ( $r = .42, p < 0.01$ ), and environmental QOL ( $r = 0.42, p < 0.01$ ). Acceptance was negatively correlated with depression ( $r = -0.53, p < 0.01$ ) and anxiety ( $r = -0.40, p < 0.01$ ). Hierarchical regression analysis was performed. It is unclear which specific variables were controlled for. The authors state that sociodemographic factors, lesion-related variables, functional independence, and coping strategies were entered as independent variables. Depression, anxiety, and global QOL were entered as dependent variables. Acceptance explained a significant proportion of variance in global QOL ( $\beta = 0.37, p < 0.001$ ), depression ( $\beta = -0.35, p < 0.001$ ), and anxiety ( $\beta = -0.31, p < 0.001$ ). Greater acceptance was significantly correlated with greater life satisfaction ( $r = 0.41, p < 0.01$ ) and well-being ( $r = 0.15, p < 0.05$ ).
Sauri et al. [40]	n = 511	M = 50.6 years (SD = 14.3) Women: 26.6%	Spain. Community sample (Hospital follow-up).	30.9% incomplete paraplegia, 37.4% complete paraplegia, 21.1% incomplete tetraplegia, 10.6% complete tetraplegia. Time since injury = 15.44 years (SD = 10.00).	Cross sectional	Spinal Cord Lesion-related Coping Strategies Questionnaire	Depression and anxiety: Hospital Anxiety and Depression Scale QOL: World Health Organization Quality of Life—Brief Version	Greater acceptance was significantly correlated with greater global QOL ( $r = 0.48, p < 0.01$ ), physical QOL ( $r = 0.38, p < 0.01$ ), psychological QOL ( $r = 0.55, p < 0.01$ ), social QOL ( $r = .42, p < 0.01$ ), and environmental QOL ( $r = 0.42, p < 0.01$ ). Acceptance was negatively correlated with depression ( $r = -0.53, p < 0.01$ ) and anxiety ( $r = -0.40, p < 0.01$ ). Hierarchical regression analysis was performed. It is unclear which specific variables were controlled for. The authors state that sociodemographic factors, lesion-related variables, functional independence, and coping strategies were entered as independent variables. Depression, anxiety, and global QOL were entered as dependent variables. Acceptance explained a significant proportion of variance in global QOL ( $\beta = 0.37, p < 0.001$ ), depression ( $\beta = -0.35, p < 0.001$ ), and anxiety ( $\beta = -0.31, p < 0.001$ ). Greater acceptance was significantly correlated with greater life satisfaction ( $r = 0.41, p < 0.01$ ) and well-being ( $r = 0.15, p < 0.05$ ).
Smedema et al. [50]	n = 242	M = 44.6 years (SD = 13.2) Women: 33.9%	USA. Questionnaire distributed through various SCI associations.	51.2% cervical, 40.5% thoracic, 6.6% lumbar, 1.7% sacral. Time since injury = 10.6 years (SD = 9.7)	Cross sectional	Spinal Cord Lesion-related Coping Strategies Questionnaire	Life satisfaction: The Satisfaction with Life Scale Well-being: The Sense of Well-Being Inventory	Greater acceptance was significantly correlated with greater life satisfaction ( $r = 0.41, p < 0.01$ ) and well-being ( $r = 0.15, p < 0.05$ ).
Smedema [54]	n = 235	M = 44.6 years (SD = 13.2) Women: 32.8%	USA. Questionnaire distributed through various SCI associations.	51.2% cervical, 40.5% thoracic, 6.6% lumbar, 1.7% sacral. Time since injury = 10.4 years (SD = 9.5).	Cross sectional	Spinal Cord Lesion-related Coping Strategies Questionnaire	Life satisfaction: The Satisfaction with Life Scale	A hierarchical regression analysis with life satisfaction as the dependent variable was conducted. Injury level, time since injury, and perceived pain were entered in the first step. Interpersonal self-efficacy and social support were added in step 2, and hope, self-esteem, and acceptance were added in the final step. Acceptance did not contribute significantly to the model over and above what was explained by the other variables.
van Leeuwen et al. [56]	n = 60	M = 46.4 years (SD = 15.9) Women: 31.7%	Netherlands. Inpatient rehabilitation from five SCI rehabilitation centers.	31.7% incomplete paraplegia, 31.7% complete paraplegia, 33.3% incomplete tetraplegia, 3.3% complete tetraplegia.	Longitudinal. T1: within 4 weeks of admission T2: 3–6 months after T1 T3: 6 months post discharge	Illness Cognition Questionnaire	Mental health: The Mental Health Index	Acceptance was only measured at T2 and T3. At both measurement points, acceptance was significantly correlated with mental health (Spearman's $\rho = 0.69$ and $0.52$ , respectively). Multilevel regression analyses with mental health as the dependent variable and self-efficacy, mastery, optimism, social comparison, helplessness, acceptance, disease benefits, and purpose in life as independent variables were conducted. The confounding effects of gender, age, marital status, education, level of injury, and completeness of injury were examined. Acceptance was a significant predictor of mental health in the basic model ( $\beta = 0.65, p < 0.001$ ) and in the change model ( $\beta = 0.52, p < 0.001$ ). The association between acceptance and mental health was thus based on within-subject variance and reflects change rather than differences between individuals.

**Table 1** (continued)

Authors (Ref.)	Sample size (n)	Mean age (SD) and gender	Country and setting	Type of injury <sup>a</sup> and mean time since injury (SD)	Study design and assessment time(s)	Measure of acceptance	Outcome measure(s) <sup>d</sup>	Key findings of the study <sup>e</sup>
Wollars et al. [41]	n = 279	M = 51.1 years (SD = 14.2) Women: 36.2%	Netherlands. Community sample with individuals who had previously received rehabilitation at SCI center.	54.5% paraplegia, 40.5% tetraplegia, 41.2% complete, 56.3% incomplete <i>Does not add up to 100% due to missing.</i> Time since injury = 11.8 years (SD = 10.7)	Cross sectional.	Illness Cognition Questionnaire	Depression: Patient Health Questionnaire-9 QOL and well-being: Two numerical rating scales (0–10) concerning general health and general well-being	Greater acceptance was correlated with greater general health ( $r = 0.33, p < 0.001$ ), greater general well-being ( $r = 0.56, p < 0.001$ ), and lower depression scores ( $\beta = -0.39, p < 0.001$ ). Further, a hierarchical regression analysis was conducted with general health, general well-being, and depression as the dependent variables, and age, gender, marital status, educational level, time since injury, cause of injury, level and completeness of injury, pain intensity, anger, helplessness, acceptance, disease benefits, catastrophizing, pain coping, and internal and external pain control as independent variables. In these models, acceptance was not a unique contributor in explaining variance in depression scores nor general health, but only in general well-being ( $\beta = 0.18, p < 0.005$ ).

**SCI spinal cord injury, QOL quality of life, PTSD post-traumatic stress disorder, SD standard deviation**

<sup>a</sup>These papers showed a positive correlation between acceptance and depression and/or anxiety. However, correspondence with the authors confirmed that these correlations were errors in the manuscripts and that the associations were in fact in the hypothesized direction (i.e., negative correlations)

<sup>b</sup>The table in the paper shows a positive association, while the authors specifically report and discuss a negative correlation throughout their paper. We have been in contact with the authors several times, but we have not received a response on this matter at the time of publication. It is assumed that the association was in fact negative

<sup>c</sup>Type of injury was reported heterogeneously in the included studies. Most differentiated between tetraplegia and paraplegia, while others also included the completeness of injury, and a few studies reported level of injury as cervical, thoracic, lumbar, or sacral

<sup>d</sup>Outcome measure(s) relevant to the present study aim

<sup>e</sup>Key finding(s) relevant to the present study aim. This may not be the primary finding of the paper

<sup>f</sup>Combined data from two sub samples (United Kingdom and Switzerland/Germany)

recruitment strategy and inadequate discussion of findings in one.

## Data synthesis

### Global and specific domains of quality of life

The association between acceptance and QOL was explored in 19 studies [12, 17, 18, 33–48]. In cross-sectional studies, greater acceptance was consistently associated with greater QOL [12, 17, 33–42, 44, 47]. Furthermore, acceptance was a significant predictor of global QOL even when sociodemographic factors (e.g., gender, age, marital status), injury-related variables (e.g., cause and type of injury, time since injury), and the other coping strategies of the SCL-CSQ (i.e., fighting spirit and social reliance) [12, 17] were controlled for. Moreover, acceptance was associated with a greater likelihood of reporting greater global QOL [33, 34]. A single qualitative study found acceptance to be a component of QOL, and was grouped with maintaining goals and motivation into the domain of psychological resources [43]. No longitudinal studies focused on global QOL.

Acceptance was also consistently correlated with greater psychological QOL in all cross-sectional studies [36, 39, 40, 44, 47]. Individuals who were moderate or high in acceptance reported significantly greater psychological QOL compared with individuals who were low in acceptance [44]. In longitudinal studies acceptance at 6 to 12 weeks post injury was significantly correlated with psychological QOL 1 and 2 years post injury [45, 49]. Furthermore, acceptance was a significant predictor of psychological QOL at 1 year post injury even when the effect of sociodemographic factors, injury-related variables, sense of coherence, cognitive appraisals, and additional coping strategies were controlled for [45]. However, acceptance was not a significant predictor of psychological QOL at 12 weeks [46] and 2 years post injury [18] when sociodemographic factors, injury-related variables, perceived manageability, sense of coherence, cognitive appraisals, and coping strategies were controlled for.

In contrast to global and psychological QOL, the association between acceptance and social QOL was inconsistent. One cross-sectional study found a significant correlation [40], and acceptance was further a significant predictor of social QOL with control for sociodemographic factors, injury-related variables, social support, and coping strategies [17]. Conversely, three other cross-sectional studies and a 2-year follow-up study reported non-significant correlations [18, 36, 47, 48].

### Well-being

The association between acceptance and well-being was investigated in four cross-sectional studies [41, 50–52] and

was consistently associated with a greater sense of well-being [41, 50, 52] with only one reporting a non-significant result [51]. Specifically, acceptance was positively correlated with general well-being [41, 50], social and family well-being [52], and psychological well-being [52]. Acceptance was also a predictor of general well-being with control for the effect of sociodemographic factors, injury-related variables, pain intensity, anger, helplessness, disease benefits, catastrophizing, pain coping, and internal and external pain control [41]. No longitudinal studies explored this association.

### Satisfaction with life

Associations between acceptance and satisfaction with life were explored in four cross-sectional studies [35, 50, 53, 54]. Their findings consistently indicated correlations between acceptance and greater satisfaction with life [50, 54]. Acceptance was a significant predictor of satisfaction with life [53] and satisfaction with health [35] even when sociodemographic factors, injury-related variables, and coping strategies were controlled for. However, acceptance was not a significant predictor of life satisfaction when injury-related variables, pain, self-efficacy, social support, hope, and self-esteem were controlled for [54]. No longitudinal studies explored this association.

### Mental health

One longitudinal study explored the association between acceptance and mental health as a global construct [55]. Acceptance was significantly correlated with greater mental health both during and after discharge from rehabilitation [56]. Further, multilevel regression analyses showed that changes in acceptance over time were associated with improvements in mental health even when controlling for potential confounding variables (see Table 1). This indicated that the association was based on within-subject variance rather than differences between individuals.

### Depression

The associations between acceptance and depression were investigated in 26 studies [11, 13, 18, 25, 33, 37–41, 45–47, 49, 51, 57–67]. Greater acceptance was associated with lower depression in most cross-sectional studies [13, 25, 33, 37–41, 47, 57, 58, 60–63, 66], with only two studies reporting nonsignificant correlations [51, 67]. When sociodemographic factors, injury-related variables, and additional psychosocial variables were controlled for, acceptance was a significant predictor of depression in four studies [13, 40, 61, 62], while three studies showed non-significant results [13, 39, 63]. One longitudinal study

conducted a series of regression analyses on cross-sectional data and reported that acceptance was associated with depression scores at six and 12 weeks post injury as well as 1 month post discharge from a rehabilitation center [13]. This was not the case at 24 weeks post injury nor 1 year post discharge [13]. The longitudinal data generally showed a similar tendency. Acceptance measured within 6 to 12 weeks post injury correlated significantly with depression at one [45] and 2 years post injury [18], while the correlation was non-significant at 10 years post injury [11]. Similarly, when the effect of sociodemographic factors, injury-related variables, cognitive appraisals, and coping strategies were controlled for, the association between acceptance and depression was inconsistent. Specifically, acceptance was a significant predictor of depression at 12 weeks and 1 year post injury, and at 1 month post discharge from rehabilitation [13, 45, 46] while the results were non-significant at 2, 10, and 21 years post injury [11, 18, 65]. Lastly, one study used latent growth mixture modeling to explore trajectories of depression and found individuals high in acceptance to show favorable trajectories of stable low depression and improvement when followed over a 2-year period [49].

### Anxiety

Associations between acceptance and anxiety were explored in 18 studies [11, 13, 18, 25, 33, 37–40, 45–47, 49, 58, 62–64, 67]. Five cross-sectional studies found that greater acceptance was related to lower anxiety [13, 25, 38, 40, 62], while four reported nonsignificant results [37, 47, 63, 67]. When sociodemographic factors, injury-related variables, and coping strategies were controlled for, acceptance was a significant predictor of anxiety in four cross-sectional studies [13, 39, 40, 62], while two reported nonsignificant results [13, 63]. One longitudinal study conducted a series of regression analyses using cross-sectional data, which indicated that acceptance was only associated with anxiety in the early stages of an injury (i.e., at 6 and 12 weeks post injury), while it was not at 24 weeks post injury nor at 1 month and 1 year post discharge [13]. In the longitudinal studies, acceptance at six to 12 weeks post injury was significantly correlated with anxiety at 1 [45] and 2 years post injury [18], but not at 10 years [11]. When the effect of sociodemographic factors, injury-related variables, and coping strategies were controlled for, acceptance did not contribute significantly to anxiety scores at 12 weeks [46], 1 year [45], 2 years [18], or 10 years post injury [11], nor at 1 month post discharge from rehabilitation [13]. Thus, while acceptance was associated with anxiety when the two were measured simultaneously, it was not associated with future anxiety scores when potential confounders

were controlled for. Lastly, individuals high in acceptance presented with a favorable trajectory of stable low anxiety as compared with delayed anxiety and anxiety improvement when followed over a 2-year period [49].

### Post-traumatic stress disorder

Two cross-sectional studies explored the association between acceptance and PTSD [19, 51]. One found that greater acceptance correlated significantly with lower PTSD symptomatology [19], while the other reported non-significant results [51]. The first study subdivided PTSD symptomatology into intrusion and avoidance and found that higher acceptance significantly predicted lower intrusion scores over and above what was predicted by sociodemographic factors, injury-related variables, coping strategies from the COPE inventory, and participant country (Great Britain, Germany, and Switzerland) [19]. The association between acceptance and avoidance was not statistically significant [19]. No longitudinal studies explored this association.

## Discussion

The aim of this systematic review was to identify, critically appraise, and synthesize relevant research findings on how acceptance is associated with QOL and mental health outcomes in individuals living with SCI. Forty-one studies were included, which collectively showed that greater acceptance was related to favorable psychosocial outcomes. Specifically, greater acceptance was associated with greater global and psychological QOL, satisfaction with life, well-being, and with lower levels of depression and anxiety. Inconsistent evidence was found with regards to social QOL and PTSD. In the majority of studies, acceptance was a significant predictor of these adjustment outcomes even when sociodemographic factors, injury-related and psychosocial variables like social support, cognitive appraisals, and coping strategies were controlled for. This was an important finding as it indicated that the observed associations were not simply due to between-group differences such as injury severity. This systematic review also identified a range of methodological issues across studies, including reliance on cross-sectional designs, lack of statistical control for confounders, poorly defined study populations, and low participation rates.

### The declining direct influence of acceptance over time

Acceptance, QOL, and mental health outcomes were much less consistently related in the longitudinal compared with

the cross-sectional studies. Acceptance predicted favorable trajectories of depression and anxiety over a 2 year period [49], and further predicted scores of both QOL and depression up to 1 year following injury [45, 46]. Conversely, acceptance did not predict QOL, depression, nor anxiety at 2, 10, or 21 years following injury [11, 18, 65]. Notably, these longitudinal studies struggled with small sample sizes (see Table 1), so it might be explained by a lack of statistical power [68]. However, it could also suggest that acceptance does not predict favorable long-term adjustment. In this light, acceptance may function primarily as a catalyst initiating favorable adjustment but declines in direct influence as the individual gradually adjusts to the new life circumstances. This could be interpreted in line with the SCIAM, which suggest that the adjustment process is dynamic and self-reinforcing (i.e., greater acceptance can lead to more favorable adjustment outcomes, and these in turn lead to even greater acceptance, and so on) [20]. Initial acceptance may, therefore, not predict future adjustment levels because mediational and self-reinforcing processes has occurred between the two time points. This interpretation finds some support in this review as the association between acceptance and later QOL and mental health disappeared only when additional psychosocial variables were included in regression models. This trend suggests that the **direct** effect of acceptance on later QOL and mental health declines over time, and either suggests that acceptance has little or no relevance over time, or that its long-term effect is **mediated** by other variables.

### Potential mediational effects

Unfortunately, such mediational effects were not explicitly tested in the included studies. However, a potentially relevant mediator was *positive reinterpretation* from the COPE inventory, which refers to construing a stressful situation in positive terms [16]. While acceptance was a significant predictor of both depression and psychological QOL, this effect disappeared whenever positive reinterpretation was added to regression models (see Table 1). There are several possible explanations. First, it could simply suggest that the aspects of acceptance that significantly predict QOL and depression share variance with other relevant constructs. It could also suggest a mediational relationship in which greater initial acceptance leads to perceiving the injury in more positive terms, a frame of mind more directly associated with lower depression and greater psychological QOL.

### The value-change aspect of acceptance

In the longitudinal studies, including the value-change aspect of acceptance (i.e., measuring acceptance with the

SCL-CSQ) generally led to significant results while omitting it (i.e., measuring acceptance with the COPE inventory) often led to nonsignificant results (see Table 1). In the transactional model of stress and coping, acceptance is assumed to decrease psychological distress by reducing the discrepancy between priorities in life and what one is capable of doing after SCI or other disability onset [25]. In this framework, it may, therefore, not be enough to *accept the reality* of the situation if it does not lead to a *process of value-change*. The results of this review tentatively supported this framework and highlighted the importance of the value-change aspect of acceptance when considering the temporal associations between acceptance, QOL, and mental health outcomes.

### Clinical implications

Health-care professionals in rehabilitation today often, explicitly or implicitly, rely on the foundational principles of rehabilitation psychology where acceptance, as elaborated by Wright, is a core principle of adjustment [69]. This systematic review adds empirical weight to this perspective as the synthesis highlighted acceptance as a psychological resource supporting the adjustment process following life-changing injuries. Individuals with greater acceptance of their new life circumstances may reduce psychological distress by reducing the discrepancy between priorities in life and what they are capable of doing. However, it is still unclear whether acceptance of SCI can be improved through psychotherapy, and whether an increase in acceptance would lead to favorable outcomes. This could be explored by investigating the effectiveness of therapeutic approaches that stimulate and support the acceptance process. Acceptance and Commitment Therapy (ACT) [70] might be promising as it aims to stimulate acceptance of what cannot be changed [70], and it has shown encouraging results for individuals with other severely disabling health conditions such as cancer [71] and multiple sclerosis [72].

### Methodological limitations of the included studies

The main issues in study quality were low participation rates, cross-sectional study designs, poorly defined study samples, and a lack of statistical control for confounders (see Supplementary Appendix 2). The low participation rates and poorly defined study samples are a major issue because the findings might only be representative of a subset of individuals with SCI who are highly engaged in research. Furthermore, the widespread use of cross-sectionally designed studies with correlational results is a major limitation because it does not permit temporal or causal inferences. Greater acceptance may thus follow from being less depressed and having greater QOL rather than the

other way around. Longitudinal studies are important in teasing out these temporal effects [73], but unfortunately most of the longitudinal studies included were based on limited sample sizes.

Another concern was the exclusive use of self-report measures. In self-reporting it is unclear what the respondent is thinking whilst filling out the questionnaire. This is a concern because acceptance may imply resignation or giving up to some respondents. For example, a qualitative study in chronic pain patients found that acceptance was perceived by some participants as an empowerment process, while others thought of acceptance as a personal failure [74].

Lastly, mediational effects were not explored in the included studies. Investigating how acceptance is associated with QOL and mental health outcomes within a mediational framework, like the SCIAM, could have important theoretical and clinical implications.

### Limitations of this review

One of the major limitations of this systematic review was the inclusion of studies with different measurement scales and methodologies such as cross sectional but also longitudinal data and bivariate but also multivariate data. This all-encompassing approach provided an overview of the research field, but was also a limitation, because many of the studies were not directly comparable. This complicated the data synthesis, and it further prohibited the use of meta-analysis to quantitatively synthesize data. Another limitation was the lack of explicit use of study quality in the selection of studies and data synthesis, where poorly designed studies with considerable risk of bias was not weighed differently than well-designed studies. A further limitation pertains to the lack of evaluation of potential reporting and publication biases. Reporting bias refers to selective reporting of results within studies [75], while publication bias refers to a bias in published academic research where positive and significant results are more likely to be published than negative or non-significant results [76]. These biases are well known in intervention studies, but it may also be a problem in observational studies where many different variables are examined and only some associations are fully analyzed, reported, and published [77]. However, no analysis of quality across studies was conducted, so the degree to which this has happened cannot be determined. Furthermore, acceptance might be associated in relevant ways to narrower constructs such as hopelessness, functional independence, or social isolation, but these were not included in this review. Lastly, only papers published in English, Danish, Norwegian, or Swedish were included, potentially excluding relevant studies published in another language.

### Future research

Future studies should first of all prioritize addressing methodological issues identified in this review. For example, they should focus on conducting longitudinal studies with sufficiently large sample sizes to tease out the temporal relationships. Moreover, how individuals with SCI understand the construct of acceptance should be explored with methods such as the cognitive interviewing approach [78], which seems promising as it systematically explores whether participants attach the intended meaning to questionnaire items [78]. In addition, future studies should explore the associations between acceptance, QOL, and mental health outcomes within a dyadic perspective where the respondents and their partner are perceived as interdependent and mutually influence each other in their adjustment process [79]. Research from related fields of disability research have shown significant dyadic effects [80], but this approach was not reflected in any of the included studies, nor in the theoretical models. It might be valuable for future studies to investigate dyadic processes and potentially revise the theoretical models accordingly. Lastly, future studies should investigate the effectiveness of therapeutic approaches that stimulate and support the acceptance process, such as ACT [70].

### Conclusion

Based on 41 studies, this systematic review highlighted the consistent association of acceptance with QOL and mental health following SCI. Generally, acceptance predicted favorable adjustment outcomes up to a 2-year period, while it did not predict adjustment outcomes at 10 or 21 years following injury. This systematic review also identified a range of methodological issues, including cross-sectional designs and lack of statistical control for confounders. Future studies should prioritize addressing these issues to enhance study quality, and it might be valuable to consider dyadic effects, explore the subjective meaning(s) of acceptance, and investigate the effectiveness of therapeutic approaches that stimulate and support the acceptance process.

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and writing the manuscript. SLR was responsible for screening identified records, conducting quality assessment, and extracting and synthesizing data. She further contributed with guidance and continuous feedback on the review protocol, tables and figures, and revisions of the manuscript. HK contributed with guidance and continuous feedback on the review protocol, tables and figures, and revisions of the manuscript. TEA was responsible for arbitrating potentially eligible studies and further contributed with guidance and continuous feedback on the review protocol, tables and figures, and revisions of the manuscript.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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