

ORIGINAL ARTICLE

# Associations between disability-management self-efficacy, participation and life satisfaction in people with long-standing spinal cord injury

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**Objectives:** To study disability-management self-efficacy (DMSE) and its correlates in a large sample of Dutch people with long-standing spinal cord injury (SCI). DMSE is the confidence that people with SCI may have in their ability to manage the consequences of their condition with respect to the various domains in their life. Research questions were: (1) What is the level of DMSE in Dutch people with long-standing SCI?; (2) Is DMSE associated with demographic and lesion characteristics?; and (3) Is DMSE associated with participation and life satisfaction if these associations are adjusted for demographic and lesion characteristics and mood?

**Methods:** Eligible people were identified from all eight rehabilitation centers with a specialty in SCI rehabilitation in the Netherlands ( $N=261$ ). Data were collected using a self-report questionnaire. DMSE was measured using the University of Washington Self-Efficacy Scale–Short Form (UW-SES-6). Correlation and linear regression analyses were used.

**Results:** Levels of UW-SES-6 scores were largely independent of demographic and lesion characteristics. UW-SES-6 scores were bivariately moderately to strongly associated with mood (0.47), participation (0.39–0.51) and life satisfaction (0.46). In the regression analyses, UW-SES-6 scores still explained a significant amount of variance of participation (standardized  $\beta$  0.31–0.33) and life satisfaction (standardized  $\beta$  0.21) when controlling for demographic and lesion characteristics and mood, and explained an additional 3.2–8.1% of the variance of participation and life satisfaction.

**Conclusion:** DMSE is a psychological resource associated with higher levels of participation and life satisfaction after SCI. The UW-SES-6 is a brief and easy to use measure of this psychological resource.

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## INTRODUCTION

Approximately 500 000 people suffer from a spinal cord injury (SCI) each year worldwide.<sup>1</sup> SCI may result in loss of motor function, loss of sensation and is associated with a variety of secondary health conditions. Having an SCI is associated with participation restrictions and lower quality of life (QoL).<sup>2,3</sup> Learning to cope with SCI is a challenging task and research shows that psychological characteristics of the people involved are important determinants of participation and QoL.<sup>4</sup>

A well-researched construct contributing to coping with disease and/or disability is self-efficacy (SE). SE is one's belief or sense of confidence in his/her own ability to perform a particular task or behavior in the future.<sup>5</sup> High SE is considered a beneficial psychological resource as it enables a personal sense of control that facilitates the initiation of, and persistence in, adaptive behavior. High SE is consistently related with higher life satisfaction, greater

psychological well-being, better mental health and less anxiety and depression in people with SCI.<sup>4,6</sup>

In the field of SCI, SE has mostly been measured as a general and stable characteristic of the individual.<sup>6</sup> However, Bandura's definition of SE emphasizes that it should be measured in terms of particularized judgments of capability that may vary across activities and circumstances.<sup>7</sup> Disability-management self-efficacy (DMSE) is the confidence that people with a chronic condition may have in their ability to manage the consequences of their condition with respect to the various domains of their life.<sup>8</sup> The concept of DMSE is more specific to the circumstances of living with a disability, but is more general compared with SE with respect to isolated functional tasks, such as wheelchair driving and pressure sore prevention.<sup>9,10</sup>

Two measures have been developed to rate DMSE in people with SCI, the Moorong Self-Efficacy Scale (MSES)<sup>7</sup> and the University of Washington Self-Efficacy Scale (UW-SES).<sup>8</sup> The UW-SES has been

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shown to fit the Rasch model as a unidimensional hierarchical scale,<sup>8</sup> whereas discrepant findings on the factor structure of the MSES have been reported.<sup>7,11,12</sup>

Regardless of the measure used, the construct of DMSE has been shown to be moderately to strongly correlated in the expected direction with measures of mood, mental health, social functioning, happiness and life satisfaction in people with SCI.<sup>7,8,11,13,14</sup> Scores on both the MSES and UW-SES appear to be independent of age, level of education, duration of the SCI and level of SCI,<sup>8,11</sup> but this has not been well investigated. Furthermore, most studies to date only reported bivariate associations between DMSE and QoL variables, or regression coefficients were only adjusted for age and gender.<sup>7,8,11,13</sup> In all these studies, depressed mood was associated with SE and all other outcomes, and hence variation in mood may have been the common factor, thereby inflating the associations between disability-management SE and QoL variables. Only one study that included a measure of depression in their regression analysis showed an independent association between DMSE and autonomy in participation.<sup>14</sup> Therefore, it remains unclear whether DMSE is an independent determinant of other participation and life satisfaction outcomes.

Hence, the aim of the current study was to study DMSE and its correlates in a large sample of Dutch people with long-standing SCI. Research questions were: (1) What is the level of DMSE in Dutch people with long-standing SCI?; (2) Is DMSE associated with demographic and lesion characteristics?; and (3) Is DMSE associated with participation and life satisfaction if demographic, lesion characteristics and mood are being controlled for?

## MATERIALS AND METHODS

### Participants

Data were used from the ALLRISC (Active Lifestyle Rehabilitation Interventions in aging Spinal Cord injury) study.<sup>15</sup> Inclusion criteria were: living with SCI for at least 10 years; age at injury between 18 and 35 years; current age between 28 and 65 years and using a wheelchair, at least for longer distances (> 500 m). This age range was chosen to include individuals with long-standing SCI while minimizing the effects of aging in general. Exclusion criterion was: insufficient mastery of the Dutch language to respond to an oral interview or to understand test instructions. Data were collected between November 2011 and February 2014. Only participants who completed the UW-SES (261 out of 282; 92.6%) were included in the current study.

### Procedure

Eligible persons were identified through databases from all eight rehabilitation centers with a specialty in SCI rehabilitation in the Netherlands. They were invited to the center for the study by their attending rehabilitation physician. Patients were asked to complete the self-report questionnaire before visiting the center for a visit including a comprehensive check-up by the physician and physical tests and an oral interview by a trained research assistant. The research protocol was approved by the Medical Ethics Committee of the University Medical Center Utrecht. All participants gave written informed consent.

### Instruments

DMSE was assessed using the short version of the UW-SES, the UW-SES-6.<sup>8</sup> Its six items concern the participants' confidence regarding the handling of potential negative consequences of their SCI. All items are scored on a 5-point scale (1: not at all; up to 5: completely). The UW-SES showed good psychometric properties with Cronbach's  $\alpha$  of 0.90 and a high correlation coefficient (0.83) with the Chronic Disease Self-Efficacy Scale, and the UW-SES-6 explained 95% of the variance of the long version.<sup>8</sup> With permission of the authors, the UW-SES-6 was independently translated into Dutch by two experts (one rehabilitation physician and one psychologist) who compared their results and negotiated a consensus translation. The *t*-scores ( $M = 50$ ;  $s.d. = 10$ )

were computed using the available transformation table.<sup>8</sup> Cronbach's  $\alpha$  of the UW-SES-6 in the current study was high (0.90) and principal components analysis showed only one component with an Eigenvalue exceeding 1 (3.96) and explaining 66% of the variance, supporting the unidimensionality of the Dutch UW-SES-6.

Mental health was measured with the Mental Health Inventory-5 (MHI-5), better known as the Mental Health scale of the Medical Outcome Study 36-item Short-Form (SF-36).<sup>16</sup> The MHI-5 consists of five questions on mood during the past 4 weeks and showed validity in a cohort of people with SCI.<sup>17</sup> The total MHI-5 score has a range from 0 (low mood) up to 100.

Life satisfaction was measured with five items from the abbreviated World Health Organization Quality of Life (WHOQOL-BREF).<sup>18</sup> The five items cover satisfaction with overall QoL and with health, daily activities, relationships and living conditions. All items are scored on a 5-point scale and the total score ranges between 5 (low life satisfaction) and 25 (high life satisfaction). The items together make up a valid scale.<sup>19</sup>

Participation was measured with the Utrecht Scale for Evaluation of Rehabilitation-Participation (USER-P).<sup>20,21</sup> Two of the three subscales were used in the current study: experienced participation restrictions (11 items) and satisfaction with participation (10 items). The USER-P showed validity in an SCI population.<sup>22</sup> Total scores of both scales range between 0 (lowest participation) and 100.

Demographic variables included were: age, gender, relational status (single versus stable relationship), nationality (Dutch versus other), having children, highest level of education achieved, employment status and living situation. Following Spinal Cord's guidelines for authors, age was categorized into 15-year increments (<45; 46–60; > 60 years). Time since injury was grouped as 10–20, 21–30, 31–40 and > 40 years. Education was dichotomized into low education (primary school only, lower vocational education) and high education (high school, college, university). SCI characteristics were assessed by the physician as part of the study according to the International Standards for Neurological Classification of SCI.<sup>23</sup> American Spinal Injury Association Injury Severity (AIS) grades A and B were categorized as motor complete lesions and AIS grades C and D as motor incomplete lesions.

### Data analyses

Associations between the UW-SES-6 score and the other variables were examined using *t*-tests or analysis of variance for categorical variables and Pearson's correlation coefficients for continuous variables. Correlations of <0.30 were interpreted as weak, between 0.30 and 0.50 as moderate and of  $\geq 0.50$  as strong.<sup>24</sup> A series of hierarchical linear regression analyses were used to investigate associations between UW-SES-6 scores and participation and life satisfaction adjusted for confounders. In the first step of the statistical analysis the demographic and lesion characteristics were included, in the second step mood was included and in the third step the UW-SES-6 scores. Preliminary analyses to check for violations of the assumptions of normality, linearity, multicollinearity and homoscedasticity were performed. All analyses were performed using SPSS v22 (IBM, Armonk, NY, USA).

## RESULTS

A total of 261 people, 192 males and 69 females, were included in the current analyses. Their characteristics are displayed in Table 1.

The mean total UW-SES-6 score was 47.5 ( $s.d. = 9.7$ ). The distribution was slightly positively skewed, but the skewness ( $-0.14$ ) and kurtosis (0.37) were well within the limits of a reasonably normal distribution. Only 1.1% of the participants scored the lowest possible score (19.5) and 3.8% of the participants scored the highest possible score (69.0).

Responses to the six UW-SES-6 items are shown in Table 2. Participants rated their disability-management ability generally positively, although for each item a substantial proportion of the participants (16.8–35.6%) expressed no or little DMSE.

Testing of differences in UW-SES-6 scores between subgroups based on demographic or lesion characteristics revealed no statistically

significant differences with respect to age, time since injury, level and completeness of SCI and etiology of SCI (Table 3).

Multiple regression was conducted to further examine possible determinants of the UW-SES-6 scores. Age and time since injury were strongly intercorrelated ( $r=0.85$ ), and hence age was removed from the model to avoid multicollinearity. Only one independent variable, lesion level, made a unique significant contribution to the model (Table 4). The full model explained only 2.2% of the variance of UW-SES-6 scores.

Bivariate correlations between the UW-SES-6 scores and measures of participation restrictions (0.39), satisfaction with participation (0.51), mood (0.47) and life satisfaction (0.46) were moderate to strong and highly significant.

Hierarchical multiple regression showed DMSE to be an independent predictor of participation and life satisfaction in all analyses, explaining between 3.2 and 8.1% of the variation in addition to the variance explained by all other variables (Table 5).

## DISCUSSION

In the present study, we described DMSE in people with SCI using a recently developed instrument, the UW-SES-6. Levels of DMSE were largely independent of demographic and lesion characteristics. Bivariate analysis showed that the DMSE was moderately to strongly associated with participation, mood and life satisfaction. In the regression analyses, DMSE explained a significant amount of the variance of participation and life satisfaction controlling for demographic and lesion characteristics and mood.

Demographic and lesion characteristics were not associated with DMSE in this study, except for level of lesion, showing that people with less severe lesions reported slightly higher levels of DMSE. However, the mean difference between people with paraplegia and those with tetraplegia was only 2.1 points, and this is small compared with the pooled s.d. of 9.6. Previous studies also showed not more than negligible associations between DMSE and demographic and lesion characteristics.<sup>8,11</sup>

**Table 1 Characteristics of the study sample (N= 261)**

Variable	
Age (years), mean (s.d.); median; (range)	48.5 (8.8); 47.9; (28.9–66.5)
TSI (years), mean (s.d.); median; (range)	24.1 (9.1); 22; (10–47)
Gender (% male)	73.6
Etiology of injury <sup>a</sup> (%)	
Sports or leisure	25.7
Violence	1.5
Occupational	10.7
Road traffic accident	45.2
Fall	9.2
Nontraumatic SCI	9.6
Lesion level (% tetraplegia)	39.8
Completeness lesion (% motor complete)	81.6
Nationality (% Dutch)	96.2
Married or in stable relationship (%)	63.0
Education (% low)	27.6
Employment (% paid employment)	39.5
WHOQOL-5, mean (s.d.); (range)	3.6 (.7); (1.6–5)
MHI-5, mean (s.d.); (range)	79 (13.2); (26.7–100)
USER-P restrictions, mean (s.d.); (range)	76.4 (18.7); (24.2–100)
USER-P satisfaction, mean (s.d.); (range)	69.6 (15.2); (2.8–100)

Abbreviations: MHI-5, mental health index; SCI, spinal cord injury; TSI, time since injury; USER-P, Utrecht Scale for Evaluation of Rehabilitation-Participation; WHOQOL-5, World Health Organization Quality of Life 5-item selection.

<sup>a</sup>Multiple answers possible.

**Table 3 Distributions of the University of Washington Self-Efficacy Scale–Short Form (UW-SES-6) scores in relevant subgroups**

	N	M	s.d.	t/F	P-value
Gender				–0.42	0.674
Male	192	47.3	9.9		
Female	69	47.9	9.1		
Age (years)				0.23	0.795
28–45	109	47.9	11		
46–60	125	47.3	8.7		
≥61	27	46.6	8.6		
Time since injury (years)				0.39	0.760
10–20	112	47.8	10.6		
21–30	83	47.0	8.8		
31–40	48	46.8	9.5		
41–47	18	49.3	8.5		
Completeness lesion				–0.53	0.653
Motor complete	213	47.4	9.9		
Motor incomplete	48	48.1	8.7		
Lesion level				–1.70	0.090
Tetraplegia	104	46.3	10.1		
Paraplegia	157	48.4	9.3		
Cause of injury				0.98	0.330
Traumatic	236	47.7	9.7		
Nontraumatic	25	45.7	9.7		

**Table 2 Distribution of scores on the short version of the University of Washington Self-Efficacy Scale (UW-SES-6)**

	Not at all	A little	Quite a bit	A lot	Completely
<i>How confident are you that</i>					
1. You can keep the physical discomfort of your SCI from interfering with the things you want to do	13.4 <sup>a</sup>	22.2	29.1	29.5	5.7
2. You can keep your SCI from interfering with your ability to deal with unexpected events	7.3	19.5	23.8	36.8	12.6
3. You can keep your SCI from interfering with your ability to interact socially	7.3	20.7	22.2	35.2	14.6
4. You can keep your SCI from being the center of your life	8.0	20.7	16.9	35.2	19.2
5. You can bounce back from frustration, discouragement or disappointment that SCI may cause you	3.4	13.4	21.5	41.4	20.3
6. You can figure out effective solutions to SCI-related issues that come up	2.3	15.7	25.3	40.2	16.5

Abbreviation: SCI, spinal cord injury.

<sup>a</sup>Values are percentages.

**The relationship between DMSE and participation**

As expected, we found positive associations between DMSE and participation. DMSE is a concept that holds relevance to participation as it refers to experienced control over living with SCI in daily and social life. Our findings are congruent with those of another recent study that found a similar correlation coefficient between DMSE and a measure of autonomy in participation.<sup>14</sup> Participation of people with SCI is determined by a range of factors, including lesion characteristics and environmental factors.<sup>25</sup> In the literature, similar associations between general SE and participation ( $r$  0.31–0.52) have been found.<sup>6,26</sup>

**Table 4 Multiple regression analysis of potential determinants of University of Washington Self-Efficacy Scale–Short Form (UW-SES-6) scores**

Model	B	s.e.	$\beta$	t	P-value
(Constant)	43.80	3.07		14.26	0.000
Gender (female)	0.39	1.39	0.02	0.278	0.782
Time since injury	-0.00	0.07	-0.00	-0.03	0.973
Lesion level (paraplegia)	2.50	1.26	0.13	1.99	0.048
Completeness (incomplete)	1.71	1.61	0.07	1.06	0.289
Cause of injury (nontraumatic)	-2.88	2.13	-0.09	-1.35	0.177

Explained variance: 2.2%.

**The relationship between DMSE and mood and life satisfaction**

SE is one of the most consistent determinants of mood and life satisfaction in the literature, with associations between SE and QoL, life satisfaction and well-being ranging from  $r = 0.23$  to  $0.73$ , and  $\beta = 0.21$  to  $0.39$ .<sup>4,6</sup> The correlation coefficient of 0.46 between DMSE and life satisfaction found in our study corresponds well with these previous results. One other study used mood as a confounder and demonstrated DMSE to be an independent predictor of participation, but the authors did not report an association statistic.<sup>14</sup> Another study used structural equation modeling to unravel associations between personal factors, participation and life satisfaction and also found a direct association between SE and life satisfaction, controlling for mood.<sup>27</sup>

**Limitations**

A limitation of the present study is that because of the inclusion criteria, our study sample predominantly consists of participants with a traumatic and complete SCI who had acquired their SCI at a relatively young age. This influences the degree to which the results of our study can be generalized to the whole population of people with SCI. Second, we used a Dutch translation of the UW-SES-6, but used the American conversion table to compute  $t$ -scores. Although the translation was carefully executed, the similarity of the Dutch and the American version needs confirmation. The score distributions in both studies are however fairly similar with a mean score of 47.5 (s.d. 9.7) in our study compared with 49.9 (s.d. 9.3) in the American sample. Finally, this is a cross-sectional study and hence no conclusions on causality can be drawn.

**Table 5 Hierarchical multiple regression analyses of possible determinants of participation and life satisfaction**

Model	Participation restrictions		Participation satisfaction		Life satisfaction	
	$\beta$	P-value	$\beta$	P-value	$\beta$	P-value
<b>Step 1</b>						
Gender (female)	-0.25	<0.001	0.04	0.503	0.06	0.327
Time since injury	-0.07	0.205	-0.07	0.287	-0.02	0.752
Paraplegia	0.49	<0.001	0.19	0.003	0.09	0.143
Incomplete lesion	0.05	0.375	-0.01	0.841	-0.02	0.744
Nontraumatic SCI	-0.03	0.028	-0.06	0.372	-0.10	0.142
R <sup>2</sup> (P-value)	51.9%	(<0.001)	4.8%	(0.028)	2.3%	(0.317)
<b>Step 2</b>						
Gender (female)	-0.27	<0.001	0.01	0.794	0.03	0.569
Time since injury	-0.08	0.135	-0.09	0.098	-0.05	0.347
Paraplegia	0.49	<0.001	0.18	0.001	0.08	0.098
Incomplete lesion	0.05	0.321	-0.00	0.949	-0.01	0.845
Nontraumatic SCI	-0.03	0.573	-0.06	0.259	-0.10	0.048
Mood	0.23	<0.001	0.51	<0.001	0.62	<0.001
R <sup>2</sup> change (P-value)	5.0%	(<0.001)	25.9%	(<0.001)	37.8%	(<0.001)
<b>Step 3</b>						
Gender (female)	-0.26	<0.001	0.02	0.737	0.03	0.534
Time since injury	-0.07	0.152	-0.08	0.108	-0.04	0.387
Paraplegia	0.45	<0.001	0.14	0.005	0.06	0.234
Incomplete lesion	0.03	0.563	-0.03	0.576	-0.03	0.602
Nontraumatic SCI	-0.00	0.967	-0.03	0.541	-0.08	0.101
Mood	0.08	0.183	0.35	<0.001	0.52	<0.001
DMSE	0.31	<0.001	0.33	<0.001	0.21	<0.001
R <sup>2</sup> change (P-value)	7.2%	(<0.001)	8.1%	(<0.001)	3.2%	(<0.001)

Abbreviations: DMSE, disability-management self-efficacy; R<sup>2</sup>, explained variance; SCI, spinal cord injury.

## Strengths

This is the first SCI study using the UW-SES in people with SCI since its development.<sup>8</sup> It is also one of the first studies to analyze associations between DMSE with participation and QoL variables accounting for mood as a confounder. In addition, data were utilized from a large sample that was recruited through all Dutch rehabilitation centers with a specialization in SCI rehabilitation in the Netherlands.

## Clinical implications

The current study supports the concept of DMSE as an important determinant of participation and life satisfaction among people with SCI. DMSE may be seen as a psychological resource that helps people to regain their QoL after SCI. Low levels of SE may act as a notification for negative psychological profiles such as depressive mood or anxiety. Monitoring levels of SE among SCI patients is therefore desirable to be able to detect low levels of DMSE at an early stage.<sup>8</sup> Interventions have been developed to increase SE with the goal of improving chronic disease outcomes.<sup>28</sup> These interventions emphasize the patient's central role in managing his or her illness by providing patients with the necessary knowledge, skills and confidence (SE) to deal with the negative consequences of their chronic illness.<sup>13</sup>

## Future research

Future studies may reveal the usefulness of the DMSE as a screener of psychological resources during rehabilitation and as an outcome of rehabilitation after SCI. Future research should also focus on effective approaches to enhance DMSE during and after rehabilitation.

## CONCLUSION

DMSE is a psychological resource associated with higher levels of participation and life satisfaction after SCI. The UW-SES-6 is a brief and easy to use measure of this psychological resource.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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