



Original research article

# Sports activities and satisfaction of living of men after cervical spinal cord injury



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## ABSTRACT

**Introduction:** Life satisfaction is a notion often combined with mental wellbeing, happiness, and contentment. This type of satisfaction directly influences the quality of life.

**Aim:** The aim of the study was to assess life satisfaction of men with the cervical spinal cord injury (CSCI), wheelchair rugby players (WR) against a control group.

**Material and methods:** The study was conducted among 36 men after CSCI. The research tool was a questionnaire of life satisfaction LiSat-9 evaluator life as a whole and some of its components.

**Results:** Significantly higher average life satisfaction component was identified among 'high point' (HP) players (4.7) compared to the value of the average result among 'low point' (LP) players (3.9) and among the inactive in sports (4.0).

**Discussion:** The results concerning self-reported life satisfaction obtained in our study are at substantially lower level compared to other studies of European populations. Low incomes represent a significant barrier to social life, contributing to the reduction in the level of self-reported life satisfaction of SCI men.

**Conclusions:** The age and athletic activity of the study participants is a key factor of live satisfaction.

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## 1. Introduction

A major type of damages to the locomotor system is spinal cord injuries (SCI). The cervical spinal cord injury (CSCI) disability leads to a number of posttraumatic problems, both early and delayed, that cause the search for optimal methods to improve body function<sup>1,2</sup>. The psychological and sociological aspects are important to active rehabilitation after CSCI while the most expected outcomes of medical and rehabilitation processes include the subjective satisfaction of the person affected by disability. Undoubtedly, other components of life such as opportunities for education, professional work, financial independence and social contacts of CSCI patients largely depend on functional and self-care abilities. These components are the basis for an independent and fulfilling life. The studies on life satisfaction among SCI patients are often based on the LISAT – 9 questionnaire (Life Satisfaction Questionnaire) used both in Europe.<sup>3,4</sup>The LISAT - 9 questionnaire has been also widely used for evaluation of life satisfaction and its

individual areas in neurological diseases,<sup>5</sup> orthopaedic dysfunctions<sup>6</sup> or genetic complexes<sup>7</sup>.

## 2. Aim

The aim of this study was to assess life satisfaction of male wheelchair rugby (WR) players against sedentary wheelchair (SED) users as controls. Accordingly, the following research questions were asked:

- Do age at injury and duration of disability represent factors in life satisfaction of men after CSCI?
- Are functional athletic abilities a factor in life satisfaction of WR players?

## 3. Material and methods

### 3.1. Participants

Thirty-six males with CSCI, who volunteered to participate in this study, were divided into two groups of SED users ( $n = 12$ ) and WR players ( $n = 24$ ). The inclusion criteria were as follows: traumatic CSCI at the C4–C7 level; time post injury over 3 years;

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locomotion: manual active wheelchair; and signed informed consent. The exclusion criteria were as follows: traumatic cervical CSCI at not more than 15 years; and age not more than 18 years. Despite a relatively small sample size, the WR players were allocated into the 'low point' (LP;  $n = 15$ , sport classes 0.5–1.5) and 'high point' (HP;  $n = 9$ , sport classes 2.0–3.5) groups, according to the classification system. The level of lesion of SED users and WR players varied from C4 to C6 and from C5 to C7, respectively (Table 1).

### 3.2. Methods

Assessment of life satisfaction was made using the Life Satisfaction Questionnaire (LISAT-9). As a tool for analysis of SCI patients, the LISAT-9 questionnaire is characterised by high reliability (Cronbach  $\alpha = 0.77$ – $0.82$ ) verified in the aspect of validity.<sup>8,9</sup> All the questionnaires were completed independently using electronic forms.

### 3.3. Statistical procedure

The assumptions of the statistical tests were verified with the Shapiro-Wilk normality test and the Brown-Forsythe test of homogeneity of variance. Several ANOVA analyses were used in order to examine the differences in the values of parameters of the level of life satisfaction between the groups varied in terms of athletic activity. The Spearman's rank correlation coefficient was also calculated.

## 4. Results

One-way analysis of variance (ANOVA) revealed a statistically significant effect ( $F = 9.10$ ;  $P < 0.05$ ) between the type of athletic activity and the self-care abilities such as clothing, washing and changing places of sitting. Further analysis of post-hoc tests revealed significant differences between physically inactive men and HP players ( $P < 0.05$ ) and between LP and HP players ( $P < 0.05$ ).

No differences caused by athletic activity were found in other components of life satisfaction (Fig. 1). Analysis of mean level of life satisfaction (see Fig. 2) revealed similar values for physically inactive men (4.0) and LP players (3.9). HP players presented the highest mean of life satisfaction (4.7) (Fig. 2).

Analysis of correlation between age of participants and components of life satisfaction in all the men after CSCI revealed significant differences in the way of spending leisure time ( $P < 0.05$ ), professional status ( $P < 0.05$ ), contacts with friends and others and mean value of the assessment of the level of life satisfaction ( $P < 0.05$ ). The correlation between the way of spending leisure time and the age of men was strong, with the

Spearman's rank correlation coefficient  $R = 0.6$ . Analysis of correlations between the age of participants with selected components of life satisfaction within the groups revealed significant variation and moderate strength of correlations only in the group of LP players. The variation concerned the way of spending leisure time ( $R = 0.6$ ;  $P < 0.05$ ), financial standing ( $R = 0.5$ ,  $P < 0.05$ ), relations with partner ( $R = 0.5$ ;  $P < 0.05$ ), and mean assessment of the level of life satisfaction ( $R = 0.5$ ;  $P < 0.05$ ) (Table 2).

A negative moderate strength was found for the correlation between the age of study participants and components of life satisfaction in the assessment of satisfaction from life as a whole ( $R = -0.5$ ), financial standing ( $R = -0.1$ ) and mean assessment of life satisfaction ( $R = -0.1$ ). No statistically significant differences were found for the Spearman's rank correlation coefficient ( $P < 0.5$ ). Analysis of correlations between the age at injury and assessment of the level of life satisfaction did not reveal significant relationships in any of the groups categorized in terms of athletic activity ( $P > 0.05$ ).

Analysis of correlations between the duration of disability and components of life satisfaction for all the men after CSCI revealed the relationships similar to the analysis of the age of the participants with components of life satisfaction in the area S3 i.e. the way of spending leisure time ( $R = 0.4$ ;  $P < 0.05$ ); in S4–professional status ( $R = 0.4$ ;  $P < 0.05$ ); S9–contacts with friends and others ( $R = 0.3$ ;  $P < 0.05$ ) and mean assessment of life satisfaction ( $R = 0.3$ ;  $P < 0.05$ ) (Table 2).

Analysis of correlations between duration of the disability and selected components of life satisfaction inside the groups revealed significant variation only between LP players ( $P < 0.005$ ). This variation concerned the mean assessment of the level of life satisfaction and was characterised by a very strong correlation, reflected by the value of the Spearman's rank correlation coefficient of  $R = 0.6$ .

## 5. Discussion

The effect of athletic activity on the psychological aspects of health in people after SCI was documented in e.g. a study by Tasiemski and Brewer.<sup>8</sup> It is likely that sport identity of LP players and high sports ambitions combined with positive personality traits represent the determinants of this low overall life satisfaction. The results concerning self-reported life satisfaction obtained in our study are at substantially lower level compared to other studies of European populations by Schornherr et al., Budh and Osteraker, and Tasiemski et al.<sup>9,10</sup> The substantially higher level of life satisfaction was found by Schönenberg et al.<sup>9</sup> In one of the biggest previous comparative studies carried out in developing Asian countries that examined SCI patients evaluated life satisfaction which, compared to our findings, was lower<sup>10</sup>. Their findings were consistent with the study by Coleman et al., with life satisfaction of the inhabitants of Latin America being also at lower level compared to our study<sup>11</sup>. The results obtained in our study are not consistent with the findings presented by Lannem et al.<sup>12</sup> A study by Hicks et al., based on a nine-month training program, demonstrated improved life satisfaction among men after SCI<sup>13</sup>. In our study, functional abilities were significantly different in the study groups. Perhaps functional abilities represent the most important determinant of life satisfaction of SCI men.

In a study Lund et al.<sup>3</sup> observed that the opportunities of participation in social life is an important factor that determines life satisfaction.<sup>14–16</sup> Undoubtedly, the ability to start professional work determines the feeling of your own effectiveness and allows for the independent life of men after cervical spinal cord injury. In our study, merely 34% of men who were physically inactive had jobs which, compared to WR players (88%), represents an

**Table 1**  
Characteristics of SCI participants.

Variable	SED ( $n = 12$ )	LP ( $n = 15$ )	HP ( $n = 9$ )
Age, years	31.9 ± 5.1	31.9 ± 5.3	34.8 ± 3.9
Age at time of injury, years	17–20 ( $n = 4$ ) 21–25 ( $n = 5$ ) 26–27 ( $n = 3$ )	16–20 ( $n = 10$ ) 21–25 ( $n = 5$ )	18–20 ( $n = 4$ ) 21–25 ( $n = 3$ ) 27 ( $n = 2$ )
Time post injury, years	10.0 ± 5.5	11.5 ± 4.8	15.1 ± 5.3
Level of spinal cord injury	C4 ( $n = 2$ ) C5 ( $n = 2$ ) C4–C5 ( $n = 3$ ) C4–C6 ( $n = 3$ ) C5–C6 ( $n = 2$ )	C5 ( $n = 9$ ) C6 ( $n = 2$ ) C5–C6 ( $n = 2$ ) C6–C7 ( $n = 2$ )	C7 ( $n = 2$ ) C5–C7 ( $n = 3$ ) C6–C7 ( $n = 4$ )
Training experience, years	–	6.6 ± 2.6	9.3 ± 4.3
Marital status (single/married)	9/3	13/2	4/5

SED–sedentary disabled males, LP–low-point WR players, HP–high-point WR players; AIS–American spinal injury association impairment scale.

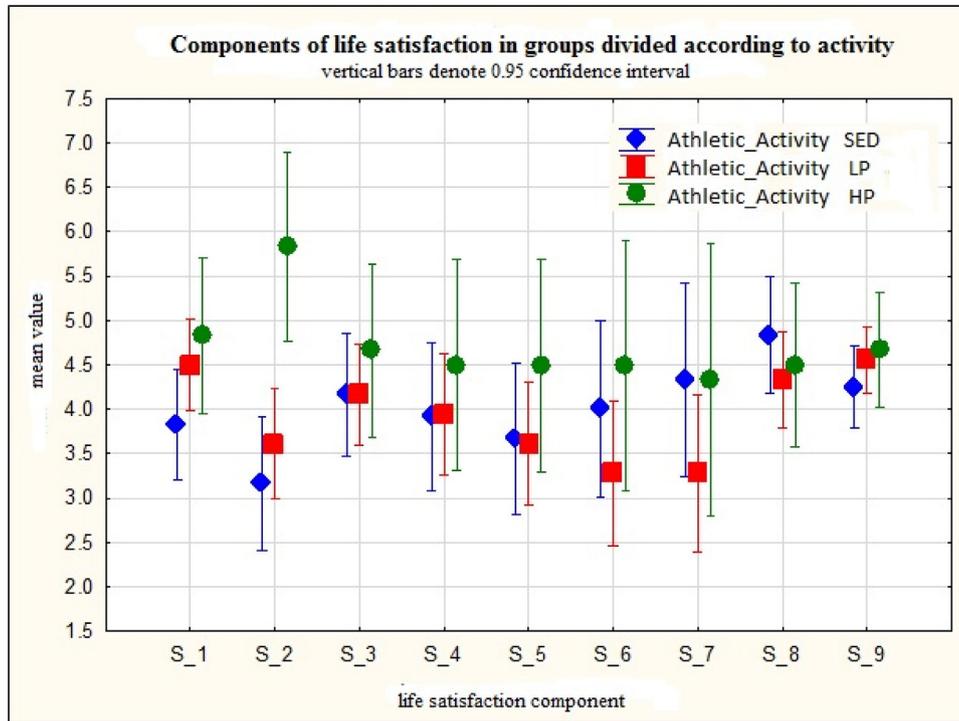


Fig. 1. Differences in life satisfaction in the groups studied.

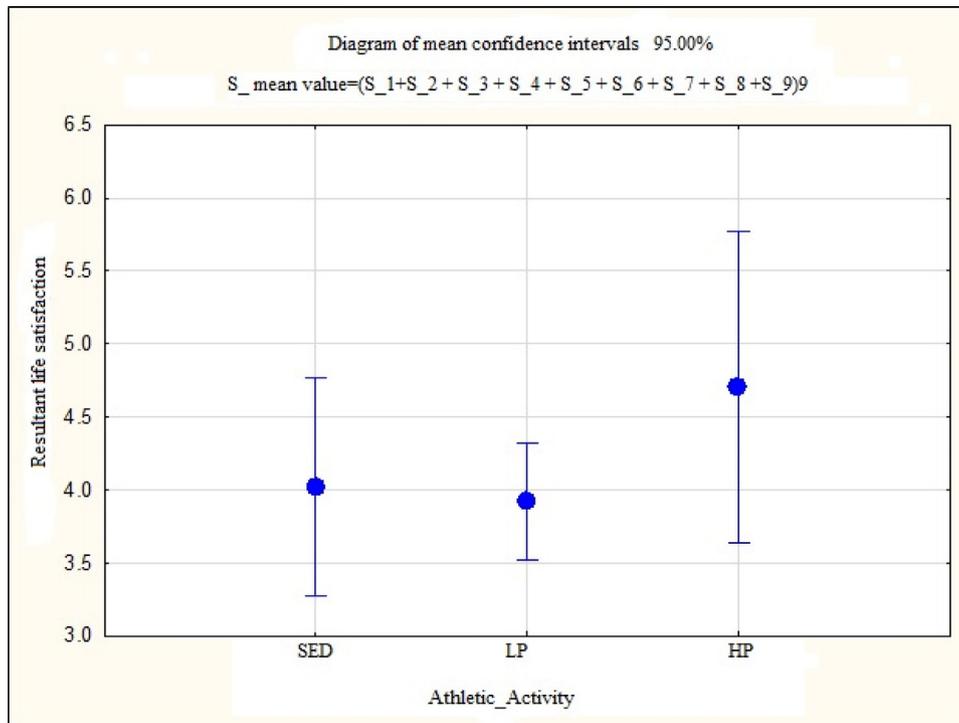


Fig. 2. Mean assessment of life satisfaction in the respondents (S1-S9).

insignificant percentage of professionally active people. In our own study, all the physically active men had cars adapted for disabled people. The men from the physically inactive group worked only as teleworkers and never left their place of residence to seek jobs. Cao et al., found that low incomes represent a significant barrier to

social life, contributing to the reduction in the level of self-reported life satisfaction of SCI men.<sup>17</sup>

The significant limitation of the study was the low number of study participants. However, the fact of purposive selection of the study groups in medical and functional terms allowed for creation

**Table 2**

Age and time post injury with division into athletic activity and components of the LISAT questionnaire.

LISAT-9	SED (n = 12)		LP (n = 15)		HP (n = 9)	
	R for age	R for time post injury	R for age	R for time post injury	R for age	R for time post injury
S1	0.3	0.1	0.2	0.2	-0.5 <sup>a</sup>	-0.4
S2	-0.2	-0.4	-0.2	0.1	-0.4	-0.1
S3	0.4	0.3	0.6 <sup>a</sup>	0.4	0.2	0.4
S4	0.2	0.4	0.6 <sup>a</sup>	0.4	-0.2	0.0
S5	-0.1	-0.1	0.1	0.3	-0.8 <sup>a</sup>	-0.6
S6	-0.04	-0.0	0.4	0.5	-0.1	0.0
S7	0.3	0.3	0.5 <sup>a</sup>	0.4	-0.2	0.1
S8	0.2	-0.1	0.3 <sup>a</sup>	0.3	-0.2	-0.0
S9	0.5 <sup>a</sup>	0.3	0.4	0.3	-0.3	-0.2
$\bar{x}$ – S1–S9	0.2	0.2	0.5 <sup>a</sup>	0.6 <sup>a</sup>	-0.1	0.1

<sup>a</sup> Statistical significance of  $P < 0.05$ .

of homogeneous research conditions, which represents an important value for reasoning.

## 6. Conclusions

- 1 The age of the study participants is a key factor that affects the differences in a way of spending leisure time and professional status.
- 2 Despite comparable functional abilities, life satisfaction in the study group of men after cervical spinal cord injury is determined by athletic activity.
- 3 As the time from injury elongates, life satisfaction of low-point players becomes high (0.6) and statistically significant, which was not found in other groups. However, the age at injury does not differ among the CSCI study participants.

## Conflict of interest

The authors declare no conflict of interest.

## Compliance with ethical standards

The present study was conducted according to the Declaration of Helsinki guidelines (Act No 9/2012 of 8 March 2012). The protocol of the study was approved by the Ethics Committee of the Academy of Physical Education. All individuals were informed of the purpose and the nature of the study before giving their written consent to participate.

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