



Quality of life in people with spinal cord injury

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Abstract: The aim of this study was to examine the quality of life of people with spinal cord injury (SCI). A sample of 105 individuals with SCI completed a set of questionnaires to assess quality of life, daily stress, somatic symptoms, social support, and hardiness. Based on multiple regression analysis, we found that the quality of life of the participants was negatively associated with the severity of SCI (the most severity type [quadriplegia] showed the lowest quality of life), as well as with worse physical health and with an increase in weekly analgesic consumption. Conversely, there was a positive association between quality of life and hardiness, social support from friends, and a home adapted to spinal cord injury. Results suggest that people with a spinal cord injury have a lifestyle quite different from that of the rest of population, and their quality of life will be significantly diminished. Also, results show that the more complete and severe the SCI, the worse quality of life.

Keywords: Quality of life; spinal cord injury; daily stress; well-being; health.

Resumen: *Calidad de vida en las personas con una lesión medular espinal.* El objetivo del presente estudio consistió examinar la calidad de vida en personas que sufren de lesión medular espinal (LME). Se aplicó un conjunto de cuestionarios a una muestra de 105 personas con LME con objeto de evaluar la calidad de vida, el estrés diario, la sintomatología somática, el apoyo social y el hardiness. Basándonos en análisis de regresión múltiple, encontramos que la calidad de vida de los participantes se asociaba negativamente con la gravedad de la LME (el tipo más grave [tetraplejia] presentaba la menor calidad de vida), así como también con peor salud física y con un incremento en el consumo semanal de analgésicos. Por el contrario, constatamos una relación positiva entre calidad de vida y hardiness, apoyo social de amigos y adaptación de la vivienda a su LME. Los resultados sugieren que las personas con LME presentan un estilo de vida distinto al del resto de la población, estando marcadamente reducida su calidad de vida. Así mismo, los resultados muestran que cuanto más grave sea la LME, más deteriorada está la calidad de vida de estas personas.

Palabras clave: Calidad de vida; lesión medular espinal; estrés diario; bienestar; salud.

Introduction

Spinal Cord Injury (SCI) is a major life event that results in important and permanent change in the life of the individual who suffers from it (Richards, Kewman & Pierce, 2000). SCI involves disruption of the neural pathways that communicate the brain with the rest of the body. The consequences of SCI are generally very serious and usually irreversibly, affecting many functions

and capacities of the patient. As such, SCI produces important changes in the life of the affected individual, altering life expectancy, and obliging to acquire new skills in order to adapt to the new situation and the way to relate to the environment.

This medical condition can be understood from a dual perspective; initially as a life event that modifies the individual's lifestyle from the very onset of the disease, and later, as a chronic problem that causes the individual to have to deal with daily setbacks. As a life event, SCI produces severe physical and psychological alterations that almost always have a negative effect on quality of life, both objectively and subjectively (Leduc & Lepage, 2002). Three well-defined stages can be established in

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the personal evolution of individuals with SCI. The first stage involves the onset and the initial weeks after the onset of the SCI; the second stage includes the period in which the individual remains in hospital; and the third stage is the period in which the individual with SCI must carry on with daily life outside the hospital (Rueda, Aguado & Alcedo, 2008).

Quality of life (QoL) is a construct increasingly used in psychology as it contemplates different aspects of personal well-being. It is a complex construct and although some definitions converge to some extent, a general agreement on its definition and conceptualization has yet to be reached. Evaluating QoL generally focuses on an individual's assessment of daily life. Health plays a fundamental role in defining QoL as it influences aspects such as work, leisure, finances, autonomy, and social relationships (Riveros, Castro & Lara-Tapia, 2009; Riveros & Vinaccia-Alpi, 2017). It can be interpreted from a dual perspective, reflecting both "objective" markers of well-being and "subjective" indicators (Rodríguez-Marín, Pastor & López-Roig, 1993). The objective markers are elements, present in the subject's physical and social habitat: comfort, wealth, environmental quality, availability of public services, and similar. An emotional component that could be added to this list would involve feelings of satisfaction or a positive state of mind, and other psychological and/or behavioural elements (Catania et al., 2015). Among external objective indicators that are most relevant to QoL are sociodemographic variables, particularly age, sex, educational level, type of employment, income, dimension and type of home, marital and family status, and social support (Cheng & Li, 2014; Rodríguez-Marín et al., 1993).

Subjective or personal indicators include the perception of health, involvement in recreational activities, general satisfaction with life, social interactions and functional skills (World Health Organization, 2002). These factors must be assessed with the use of self-reports. Health is one of the strongest predictors of satisfaction with life and it seems that subjective assessment of health is more related to personal well-being than any external objective assessment (Mishra, Scherer, Snyder, Geigle & Gotay, 2014). Given the relevance of health as a component of QoL, not being healthy implies a state that undermines well-being. Indeed, disease complicates and disrupts individual's behaviour, and their normal lifestyle, causing an imbalance that is commonly known as a stressful situation (Mishra et al., 2014).

There is no consensus as to the elements that contribute most to QoL. As indicated above, the QoL construct comprises objective and subjective variables,

and the individual's self-assessment depends on context. Thus, it needs constant comparison of relevant criteria with the individual's aspirations, expectations, reference groups, personal values, attitudes and needs (Riveros et al., 2009). In short, QoL can be considered as a subjective appraisal of the extent to which happiness has been achieved in the sense of personal well-being/discomfort (Acquadro, Conway, Hareendran & Aaronson, 2008; Guyatt & Schunemann, 2007). Some possible relevant psychological variables related to QoL include hardiness, social support, subjective health, and stress.

Hardiness is a relatively stable personality factor that manifests as an optimistic outlook when facing stress. Hardiness involves three concepts: (a) commitment, (b) challenge, and c) control (Khoshaba & Maddi, 2008; Kobasa, 1979). It is established at early stages of life, although it can be trained and shaped under certain conditions (Kelly, Matthews & Bartone, 2014; Kobasa, 1979). *Hardiness* has been related to QoL, whereby an individual with greater hardiness generally reports higher QoL.

Social support has been interpreted as an individual's access to the social resources that help cope with stressful situations. It is obtained through the family environment, friends and social networks (Goodwin, Cox & Clara, 2006). It has been proposed that the social support system is important because it protects the psychological and physical integrity of the individual (Sandín, 2009).

Subjective health denotes the value an individual gives to different psychosomatic areas related to global health and it is usually measured using self-report scales (Watson & Pennebaker, 1989). It is possible that these types of scales may also offer a moderate measure of objective health. A high QoL has been shown to be positively related to a favourable assessment of health, both objectively and subjectively (Acquadro et al., 2008; Guyatt & Schunemann, 2007; Rodríguez-Marín et al., 1993; Solans et al., 2008). By contrast, deterioration of subjective health has been associated with a decrease in QoL (Douma, Aaronson, Vasen & Bleiker, 2008; Liem, Bosch & Hunink, 2008; Palese et al., 2008; Lawford & Eiser, 2008).

Daily stress refers to minor setbacks, vicissitudes or hassles that often occur in an individuals' life, and that may generate considerable discomfort (DeLongis, Lazarus & Folkman, 1988; Kanner, Coyne, Schaefer & Lazarus, 1981; Sandín, 2008, 2009; Sandín, Chorot, Santed & Valiente, 2002; Santed, Sandín, Chorot & Olmedo, 2000). Some measure of daily stress is thought to improve an individual's well-being, whereas a severe increase in daily stress provokes a deterioration of

perceived QoL (Camacho et al., 2002; Dunn, Whelton & Sharpe, 2006).

Self-evaluation of QoL by individuals with SCI could be very negative in the first stage when they experience a sudden, unexpected and dramatic deterioration of their physical, social and work capacity. Once the initial impact of SCI has been overcome, the individual needs to adapt to new living conditions and to again become integrated into their community. Thus, in this second stage there is some degree of variation and uncertainty regarding their QoL, as with other variables related to the life of these individuals. Finally, predicting QoL is difficult in the third stage, when the individual with SCI is reinstated in day-to-day life. Insofar as subjective QoL is influenced by the objective indicators indicated above, this would be of particular relevance for individuals with SCI.

The main objective of this study was to examine the QoL of individuals that have suffered SCI and are in the third stage of this condition, when the individual is socially interactive in day-to-day life. Relationships were analysed between QoL and various objective indicators (SCI, consumption of analgesics and antispasmodics), psychosocial variables (hardiness, social support of family and friends), sociodemographic variables (sex, adapted housing, marital status, use of wheelchair, occupation prior to SCI, number of persons providing support and level of support, age, time since SCI, degree of disability, and level of income), and in particular, subjective health (somatic symptoms) and daily stress.

Method

Participants

Specific inclusion and exclusion criteria were established to select the participants for this study. Given that the study focuses on the QoL of SCI sufferers in the third stage of the disease, the participants could not be hospitalized as a result of recently suffering SCI as these patients have obviously not yet experienced the issues related to SCI beyond the confines of the hospital. Thus, to ensure that the participants were in the third stage of disease evolution, questionnaires were sent by post to individuals who had been admitted to hospital with SCI and had been discharged. SCI patients admitted to nursing homes were not included in the study. In addition, due to the characteristics of the questionnaire, only adult patients were included.

A letter of invitation and the questionnaire were initially sent by post to 621 patients with SCI and registered with the National Federation ASPAYM

(Asociación de Personas con Lesión Medular y Grandes Discapacitados Físicos [*Association of Paraplegics and People with Severe Physical Disabilities*]). The letter invited them to participate voluntarily in the study, explaining its characteristics and objectives, the procedure, benefits, discomfort and possible risks, as well as their rights. As a result, 105 sufferers of SCI returned the questionnaires fully completed, constituting the sample for our study ($N = 105$). The age of the participants in this study ranged from 19 to 73 years ($M = 42.36$ years; $SD = 11.02$), 75 were male (69.5%) and 32 were female (30.5%). The time since the onset of SCI ranged between 1 and 66 years ($M = 16.54$ years; $SD = 12.61$). Sociodemographic data and characteristics of the participant's injury are presented below (see the Results section, Table 2).

Instruments

Quality of Life Questionnaire (QoLQ; Ruiz & Baca, 1993). This questionnaire measures the degree of well-being of individuals in relation to various aspects of their daily life and the situations they must confront. It consists of 39 items, including 4 items that form an additional scale for those individuals who have partners. The subjects are asked to evaluate the current impact of different everyday situations on their QoL, using a Likert-type scale: from 1 = not at all to 5 = a lot. The reliability and validity of the psychometric data obtained with this scale have been shown to be adequate (Ruiz and Baca, 1993). Since the nature of the study population may impose severe limitations on their work activity (if any), and since the first eight items of the QoLQ refer to situations relevant to the working environment, 33 subjects did not respond to these items, representing 31.4 % of the total sample. Hence, the data from two subscales containing items related to work activities were not analysed ("general satisfaction" and "free time or absence of an excessive workload") and the overall score of the QoLQ was recalculated. Furthermore, as our sample was acquired from a mixed population in relation to the marital status variable, the data obtained with the additional scale of 4 items for individuals with partners were disregarded, as recommended by the authors of the QoLQ test.

Escala de Estrés Diario para Personas con Lesión Medular Espinal [*Daily Stress Scale for People with Spinal Cord Injury*] (EED-LME-26; Angulo, Santed, Sandín & Reales, submitted). This instrument aims to assess discomfort in daily life related to different situations faced by individuals that have suffered SCI. Participants are asked to indicate and rate the option that best reflects

the frequency with which these situations arise in their daily life, as well as the intensity of psychological distress caused by such situations over the two-month period prior to completing the questionnaire. Two Likert-type scales were used for this purpose for each item, the first evaluating the frequency with which each situation is faced [0_a-0_b = I have not been in such a situation in the past 2 months; 1 = Once in the last two months more or less; 2 = Once a month more or less (twice in the last two months more or less); 3 = Twice a month more or less; 4 = Once a week more or less (3 to 5 times a month); 5 = From 2 to 4 times a week (8 to 16 times a month); 6 = It occurs almost daily; and 7 = It is a situation usually present in my daily life]. The response option " 0_a-0_b " refers to the dual possibility of the event not occurring. On the one hand, 0_a refers to not having to face a stressful situation as it would pose real difficulties for the individual who therefore avoids having to confront such a situation (e.g. making the bed in the case of a quadriplegic subject). Alternatively, 0_b indicates that the event was not relevant within the period studied (e.g. performing a transaction at the bank). The degree or intensity of the psychological distress produced by such situations was also assessed on a scale of: 0 = no discomfort at all, to 10 = extreme discomfort.

Escala de Síntomas Somáticos para Personas con Lesión Medular Espinal [Somatic Symptoms Scale for People with Spinal Cord Injury] (ESS-LME; Angulo, Santed, Sandín & Reales, submitted). It is an adaptation of the revised ESS (ESS-R; see Sandín, Valiente and Chorot, 2008) to people with SCI, based on empirical criteria (common symptoms of disorders affecting the different systems of the human body). It consists of 80 items, with an additional subscale of 10 items that are specific to women. Data on the psychometric goodness-of-fit and validity of the ESS have been obtained previously (Sandín et al., 2008). The ESS-LME is a 48-item version of the SSS-R adapted to individuals with SCI. Two Likert scales were used in the ESS-LME, (a) *frequency* of somatic symptoms [0 = It has not occurred in the past 2 months; 1 = Once in the last two months more or less; 2 = Once a month more or less (twice in the last two months more or less); 3 = Twice a month more or less; 4 = Once a week more or less (3 to 5 times a month); 5 = From 2 to 4 times a week (8 to 16 times a month); 6 = It occurs almost daily; and 7 = It is a symptom usually present in my daily life]; and (b) *intensity* of the psychological distress (from 0 = no discomfort at all to 10 = extreme discomfort). In the instructions, the subjects were asked to indicate how they had been affected by each of the referred somatic manifestations over the past two months. The reliability of the total score obtained for this scale in our sample

was $\alpha = .88$. Correlations with related scales were: .30 ($p < .01$; EED-LME-26), $-.47$ ($p < .01$; QoLQ), and $-.29$ ($p < .01$; CPRE).

Cuestionario de Personalidad Resistente al Estrés [Stress-Hardiness Personality Questionnaire] (CPRE; Bermúdez, 1997). A hardy person is one who has a high degree of commitment, who considers situations as challenges and not as threats, and who tends to perceive themselves as having a good degree of internal control when faced with different situations (Kobasa, 1979). The questionnaire evaluates these variables using 20 items, and individuals are asked to indicate the degree to which each of these variables describes their usual way of feeling, thinking and/or behaving. A 4-point Likert-type scale is used in this assessment, ranging from 0 = not at all, to 4 = fully. The CPRE displays adequate reliability in our sample ($\alpha = .87$), and in terms of discriminant validity statistically significant correlations were obtained with the EED-LME-26 ($r = -.28, p < .01$) and with the SSS-LME ($r = -.29, p < .01$).

Social Support Behaviors (SS-B) Scale (Vaux, Riedel & Stewart, 1987; Sandín, Valiente & Chorot, 2008). This questionnaire measures the degree of social support that is perceived by the individual, who is requested to estimate the support received from the family and that received from friends separately. A Likert-type scale is used for this assessment (from 0 = nobody would do this for me, to 4 = most of my relatives or friends would do this for me). In our sample the SS-B displays an adequate reliability index for family ($\alpha = .98$) and friends ($\alpha = .99$).

Use of medication. The use of medication was assessed to provide objective indicators of the symptomatology associated with SCI. The quantity of analgesics and antispasmodics taken by the participants (number of tablets) was recorded over the two-month period prior to the study. Weekly analgesic intake was measured, while the intake of antispasmodics was assessed as the amount taken daily, both over the period of two months. This method of recording the consumption of these types of medication is considered adequate in clinical settings, and their values are related to health and QoL in a similar manner.

In addition, the following specific information was collected from the individual with SCI: date of birth, sex, civil status (with or without a partner), occupation prior to SCI, type of SCI (paraparesis, paraplegia, quadriplegia or quadriplegia), year of SCI, onset/time since SCI onset/age at SCI onset, degree of disability (as a percentage), wheelchair use (yes or no), number of people that provide support and the degree of support, adapted housing (yes or no), and household income.

Procedure

The information was collected from individuals with SCI corresponding to the two month period prior to the receipt of the completed questionnaire. The measuring instruments described above were assembled into a double-sided booklet that was given to the participants to be completed. All socio-demographic data were collected by self-report. The booklet was accompanied by an information sheet containing general instructions on how to proceed. All the material was sent to the participants by post, along with a prepaid envelope to return the completed booklet to a PO box. Telephone and email support were available at all times to clarify any of the participant's queries. Statistical analysis was performed using the SPSS 21 software for Windows (IBM Corp, 2012). The study was approved by the National Federation ASPAYM (Asociación de Personas con Lesión Medular y Grandes Discapacitados Físicos [*Association of Paraplegics and People with Severe Physical Disabilities*]).

Results

Descriptive statistics of the sample

Table 1 shows the means, standard deviations and Cronbach's coefficients on the psychological measures for men and women participants. Sociodemographic data and characteristics of the participant's injury are presented in Table 2. The degree of disability ranged between 33 % and 100 % ($M = 80.21$; $SD = 9.44$). The proportion of men with SCI was more than twice that of females, reaching almost three-quarters of the total sample (male = 69.5 %, female = 30.5 %). The number of cases with incomplete SCI (paraparesis and quadriparesis) did not reach 20 % of the study cohort and it is noteworthy that more than half of the participants with SCI were paraplegic.

Table 1. Descriptives for the psychological measures

	<i>M</i>	<i>SD</i>	α	Sex			
				<i>Male</i>		<i>Female</i>	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
QoLQ	87.76	18.47	.93	87.15	16.80	89.16	22.03
EED-LME-26	72.87	25.79	.79	72.92	26.78	72.75	23.79
ESS-LM	52.77	31.72	.88	53.14	30.24	51.94	35.37
CPRE	59.54	10.28	.87	59.32	10.20	60.06	10.62
Family SS-B	137.20	37.28	.99	133.26	38.17	146.19	34.03
Friends' SS-B	112.70	43.83	.99	110.97	43.93	116.63	44.03

Note: QoLQ = Quality of Life Questionnaire; EED-LME-26 = Daily Stress Scale for People with Spinal Cord Injury; ESS-LM = Somatic Symptoms Scale for Spinal Cord Injury; CPRE = Stress-Hardiness Personality Questionnaire; SS-B = Social Support Behaviors Scale.

In terms of wheelchair use, a high percentage of subjects used a wheelchair permanently (94.3 %) compared to those who did not (5.7 %), which is logical since the use of wheelchair is normally an inherent consequence of SCI. Regarding adaptations of the home to the needs of the SCI persons, many had their house adapted (81.9 %), although a significant number had not (18.1 %). This implies overcoming the economic and temporal demands involved or having moved to an adapted house.

Regarding the marital status of the participants, almost half of the participants (43.8 %) were married, while slightly more than a third of the sample had no partner (40.0 %). Of these 42 individuals without a partner (separated, divorced, widowed or with no partner at the time of data collection), only 6 (5.8 %)

had a partner at some point. In addition, a total of 17 participants (16.2 %) lived with a partner but were not married.

The monthly household income was calculated, not only that of the individual with SCI, but also that of any parent, partner or child living with the person with SCI. It should be noted that over half of the families that participated in the study ($n = 57$; 54.3 %) had a monthly income lower than 1000 €, and just over a quarter ($n = 28$; 26.7 %) had a monthly income between 1000 € and 3000 €. This was consistent with the high degree of unemployment associated to SCI. A monthly income above 3000 € was only associated with a small number of the households in which there was a family member with SCI ($n = 12$; 11.4 %). We obtained no answer to this question from 8 participants (7.6 %)

Regarding the personal attention or support received by the individual with SCI, almost three out of four participants in the study ($n = 78$; 74.3 %) had at least one person who routinely kept them company and/or provided them with physical/psychological support, while fewer individuals with SCI had little ($n = 18$; 17.1 %) or no ($n = 9$; 8.6 %) support. The absence of support does not indicate the absence of a need for it. In Table 2 we present a summary of these descriptive statistics.

Table 2. Sociodemographic and medical condition variables

		<i>n</i>	%
Sex	Male	73	69.5
	Female	32	30.5
Type of SCI	Paraparesis	12	11.4
	Paraplegia	56	53.3
	Quadriparesis	7	6.7
Wheelchair use	Quadriplegia	26	24.8
	Permanently	99	94.3
Adapted housing	No use	6	5.7
	Yes	86	81.9
Marital status	No	19	18.1
	With partner	63	60.0
Monthly income	Without partner	42	40.0
	< 1000 €	57	54.3
	1000-3000 €	28	26.7
Number of people providing support and level of support	> 3000 €	12	11.4
	No support at all	9	8.6
	Little support	18	17.1
	Considerable support	33	31.4
	Fully supported	45	42.9

Note: SCI = spinal cord injury

Relationship between sociodemographic variables and quality of life

A series of *t*-tests and one-way analysis of variance were performed to examine the association of the categorical socio-demographic variables with the quality of life. Were only found significant associations for adapted housing, type of SCI, and number of people providing support and level of support (see Table 3). Concerning the type of SCI, the mean of QoLQ for quadriplegia differed significantly from paraparesis ($p < .05$) while marginally significant for paraplegia ($p = .054$); no other groups comparison was significant. Regarding the number of people

providing support, only the difference in QoLQ between participants fully supported and those with little support was significant ($p < .05$).

Explanatory-predictive model of the quality of life

The correlations between QoLQ and the rest of measured variables [daily stress (EED-LME-26), somatic symptoms (ESS-LM), daily consumption of antispasmodics, weekly consumption of analgesics, hardness (CPRE), social support from family and friends (SS-B), age, time since SCI onset, degree of disability, level of income, type of SCI, marital status, sex, adapted housing and wheelchair use] were computed (see Table 4). As can be seen, the QoLQ scores were significantly correlated with EED-LME-26, ESS-LM, weekly analgesic consumption, CPRE, family SS-B, friends SS-B, years since SCI onset, degree of disability, quadriplegia, and adapted housing. No other correlations reached a statistical significant level.

In order to perform a multiple regression analysis to predict QoLQ, in the first place we assessed main statistical assumptions of multiple regression. We found two skewed variables (social support from family and income) that were transformed to achieve normality (Leech, Barrett & Morgan, 2005). A lack of multicollinearity was observed, that is, no correlation between predictive variables was higher than .50 and the FIV statistics were appropriate. Linearity of relationships was assessed plotting the standardized residuals along the predicted values standardized. No pattern appeared in the plot. Nominal and dichotomous variables were coded as is recommended in Cohen, Cohen, West & Aiken (2003) using $k-1$ new dichotomous variables for a nominal variable with k categories. To avoid the loss of 24 cases with some missing data, we used the mean imputation method for the missing values. The re-coding was used for types of SCI injury (paraparesis, paraplegia, quadriparesis and quadriplegia). Since the variables sex, adapted housing, marital status of participants (with and without partner) and use of wheelchair are dichotomous, there was no need to modify them. Sex was operationalized as 0 = male and 1 = female, adapted housing as 0 = No and 1 = Yes, participant with partner as 0 and without partner = 1, and wheelchair use as 0 = No and 1 = Yes.

The multiple forward regression analysis was then carried out with QoLQ as the criterion variable, and all psychological and socio-demographic variables (except birth date and income) as the predictive variables. This combination of variables significantly predicted QoLQ [$F(7,97) = 21.971$; $MC_{error} = 141.384$; $p < .001$; $R^2_{adjusted} = 0.585$]. Moreover, the beta weights, suggest

Table 3. Differences in QoL according to sociodemographic and medical condition variables

		<i>M</i>	<i>SD</i>	<i>t/F</i>	QoLQ
Sex	Male	87.15	16.92	<i>t</i>	-.506
	Female	89.16	22.03		
Adapted housing	Yes	90.71	16.75	<i>t</i>	3.551**
	No	75.25	20.55		
Wheelchair use	Permanently	87.62	18.88	<i>t</i>	-.288
	No use	89.71	11.94		
Marital status	Without partner	75.60	18.89	<i>t</i>	1.29
	With partner	93.68	14.76		
Type of SCI	Paraparesis	95.67	10.72	<i>F</i>	3.182*
	Paraplegia	90.93	16.86		
	Quadriparesis	85.43	24.21		
	Quadriplegia	79.96	19.07		
Occupation	No activity	79.46	19.28	<i>F</i>	1.106
	Official	101.27	9.49		
	Post-graduate activities	86.00	9.90		
	Activities without a college degree	97.50	15.61		
	Education (teacher - student)	88.09	19.72		
	Collaboration with an association	99.12	10.65		
	Housewife	104.00	9.90		
	Services	75.67	8.39		
Number of people providing support and level of support	Art	94.25	9.22	<i>F</i>	3.062*
	No support at all	90.25	22.76		
	Little support	79.78	22.00		
	Considerable support	83.88	16.74		
	Fully supported	93.09	16.17		

Note: SCI = spinal cord injury; QoLQ = Quality of Life Questionnaire. * $p < .05$, ** $p < .01$.

that CPRE is the variable that most accurately predicts the QoLQ, followed by friends' SS-B, ESS-LM, adapted housing, quadriplegia, the number of people providing support and the level of support, and weekly number of analgesics as the predictive variables (see Table 5). The $R^2_{adjusted}$ value was .585, indicating that more than 58.5 % of the variance in QoL achievement was explained by the model in the last step of the statistical procedure. According to Cohen (1988), this is a large effect size.

Discussion

In the present study we examined the QoL in a sample of individuals with SCI, and its association with some relevant psychological (daily stress, somatic symptoms, hardiness, and social support), sociodemographic, and other variables related to the medical condition (adapted

housing, use of wheelchair, type of SCI, and use of analgesics). Results indicated that hardiness, social support from friends and somatic symptoms significantly predicted the level of QoL of the participants. Hardiness was the first variable that was entered into the forward step by step regression analysis, and it is consistent with previous literature concerning the positive effect of this variable reducing the impact of stress (e.g., Aubi, Teimory & Nayveri, 2010). Hardiness is a personality resistant to stress and, as predicted, in the present study was positively related to QoL.

The social support received from both family and friends was also positively related to QoL, although the data from the regression model indicates that for a person with SCI the support of friends appears to be more relevant than that of the family. It is likely that the support provided by the family is taken for granted by

Table 4. Pearson correlations between QoLQ and the remaining variables of the study

Construct	Variable	QoLQ
Daily stress	EED-LME-26	-.31**
Somatic symptoms	ESS-LM	-.46***
Medication use	Antispasmodics taken daily	-.08
	Analgesics taken weekly	-.29**
Stress hardiness	CPRE	.51***
Social support	Family SS-B	.27**
	Friends' SS-B	.44***
Sociodemographics	Age	-.01
	Years since the SCI onset	.21*
	Level of income	.17
	Marital status: With/without partner	-.05
	Sex: Male-Female	.05
Type of SCI	Paraparesis	.15
	Paraplegia	.16
	Quadriparesis	-.04
	Quadriplegia	-.27**
Adapted housing	Yes-No	.33**
Wheelchair use	Permanently - No use	.03
Disability	Degree of disability	-.25*

Note: QoLQ = Quality of Life Questionnaire; EED-LME-26 = Daily Stress Scale for People with Spinal Cord Injury; ESS-LM = Somatic Symptoms Scale for Spinal Cord Injury; CPRE = Stress-Hardiness Personality Questionnaire; SS-B = Social Support Behaviors Scale; SCI = spinal cord injury. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 5. Forward regression analysis. Variables that significantly predicted QoLQ controlling for the remaining variables, in the last step

Independent	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
CPRE	.62	.123	.34	5.035**	.001**
Friends' SS-B	.12	.028	.29	4.433**	.001**
ESS-LM	-.10	.042	-.17	-2.396*	.018*
Adapted housing	12.53	3.246	.27	3.861**	.001**
Quadriplegia	-8.86	2.815	-.21	-3.146**	.002**
Number of people providing support and level of support	3.74	1.254	.19	2.980**	.004**
Weekly consumption of analgesics	-.24	.084	-.19	-2.846**	.005**

Note: QoLQ = Quality of Life Questionnaire; EED-LME-26 = Daily Stress Scale for People with Spinal Cord Injury; ESS-LM = Somatic Symptoms Scale for Spinal Cord Injury; CPRE = Stress-Hardiness Personality Questionnaire; SS-B = Social Support Behaviors Scale. * $p < .05$, ** $p < .01$.

the individual with SCI. Thus the support provided by friends is more strongly valued. Further research will be necessary to clarify this assumption but nevertheless, stronger social support would protect SCI persons from

external factors that may affect their QoL. Indeed, studies of other sectors of the population appear to confirm this hypothesis (e.g., Yao, Zheng & Fan, 2015). We found also that the number of people providing support and

the level of support show that the higher these are, the higher is the value of QoL measured in the SCI person; these data are consistent with past research (Barclay, McDonald, Lentin & Bourke-Taylor, 2016; Chun & Lee, 2013; Dyck et al. 2016; Keegan, Chan, Ditchman & Chiu, 2012; Lucke, Martínez, Méndez & Arévalo-Flechas, 2013). The possibility of having the support of friends or family had a positive influence on the individual's QoL, which was greater as the support received by the SCI person became more complete. Similar results have been reported in other general studies that have assessed this issue (Hu et al., 2016; Kratz, Sander, Brickell, Lange & Carlozzi, 2017; Navarta-Sánchez et al., 2016; Thai, Barnhart, Cagle & Smith, 2016).

The relationship between QoL and somatic symptoms was statistically significant in the sense that the greater the health problems, the lower the QoL perceived. This datum would appear to make sense, since health problems are a variable that alter the individual's normal rhythm of life and that is associated with dysfunction (Krause, Bombardier & Carter, 2008; Overholser & Schubert, 1993; Richardson & Richards, 2008; Wood-Dauphinée & Exner, 2002).

Individuals with SCI who had their home adapted to their condition have a higher self-perceived QoL, in accordance with other studies addressing personal experience with different types of housing (Drake & Herbert, 2015). This fact is consistent with the idea that living in conditions compatible with SCI will obviously provide a better QoL. Our regression model placed considerable value on this variable and it should be taken into account when promoting better QoL in persons with SCI.

Analysing the differences between the means of the four types of SCI indicated that the greater the disability caused by SCI the lower the QoL, as indicated previously (Erosa, Berry, Elliott, Underhill & Fine, 2014; Sutton, Ottomanelli, Njoh, Barnett & Goetz, 2015). Of the four types of SCI proposed here, the regression model showed that quadriplegia would most severely affect the individual's QoL, while the other three types do not appear to significantly affect QoL. As expected, having less disability was reflected in a better QoL since the extent of disability always influences the relative disruption of the individual's well-being.

High analgesic consumption was also associated with a lower QoL, consistent with the consumption of analgesics as a symptom of distress (physical or psychological) and in line with other studies addressing this type of relationship (see for example Gómez-Beldarrain, Anton-Ladislao, Aguirre-Larracochea, Oroz & García-Moncó, 2015; Tiggelman, van de Ven, van Schayck & Engels,

2015). However, the contribution of antispasmodic consumption to the regression model was limited, and although the relationship was not statistically significant, the results did suggest that the greater the consumption of analgesics the lower the QoL. This would seem logical because spasticity is an uncomfortable and unpleasant phenomenon associated with a poor QoL.

The relationship between QoL and daily stress was statistically significant in the sense that the higher the daily stress, the lower the QoL perceived. However, this variable did not enter into the regression model. This could be due to the size of our sample ($N = 105$) or to some other uncontrolled factor, and further analysis with larger cohorts seems appropriate. Otherwise, possible effects of additional forms of psychosocial stress should also be addressed as well (e.g., Sandín & Chorot, 2017).

The marital status of the SCI patient did not have a statistically significant influence on QoL. As expected, the absence of a spouse (due to death) generates unhappiness that is reflected in a lower QoL. Regarding the other categories of civil status, it is noteworthy that individuals with SCI who have a partner do not report a better QoL, even though one would expect a partner to offer important and fundamental support. It may be that SCI sufferers take for granted the well-being that results from their partner's company. Alternatively, it may be that the partner of an individual with SCI neither provides well-being nor discomfort. This issue should be addressed in further and more comprehensive studies to clarify the influence of this factor, as well as the effect in caregivers of individuals with this chronic condition (García-Guillamón et al., 2017).

The relationship between QoL and the individual's sex, age, use of wheelchair, occupation prior to suffering the SCI and monthly household income did not appear to be significant. These data are consistent with other studies addressing some of these factors (see for example Dantas, 2016; Gattino, Rollero & De Piccoli, 2015; Gsellmeier, Cochram & Dauenhauer, 2015) and these variables were also excluded from the regression model. It would seem natural that the sex of the SCI patient does not affect their QoL because the physical, psychosocial and health disorders caused by SCI are similar for men and women. Age was negatively related to QoL, so that the older the SCI patient, the lower their well-being. This relationship was not statistically significant, so it seems that aging does not significantly influence the perceived QoL.

Disability is an external measure that was relevant in the analysis and negatively correlated with QoL (the higher the degree of disability the lower the QoL value). Wheelchair use was of interest as it did not appear to

be significantly associated with QoL. As such, the discomfort caused by the obvious limitations related to wheelchair use did not appear to have a stronger effect on SCI persons than the possibility it offers to move around and perform various activities. Nevertheless, further comprehensive studies would be desirable to better understand the role of this variable.

The passage of time since the onset of SCI is another element that favours better adaptation to the environment, as the mere passage of time allows sufferers to assimilate and internalize their new lifestyle. However, this variable did not seem to be determinant in evaluating QoL. Furthermore, the individual's occupation prior to SCI did not modify their perception of QoL. This could have multiple causes, such as the individual with SCI performing the same work or receiving a good compensation (in the case of an accident at work) thus having no economic concerns, or they were not emotionally attached to their profession, which was considered a part of the past.

Some clinical implications could be drawn from these results in order to improve the QoL of people with SCI: (a) to suggest the use of cognitive behavioural therapy to address the individual's personality and management of stressful situations and somatic symptomatology; (b) individual guidance could be of help in developing new social relationships and strengthening existing ones; (c) improvements in the support from the individual's family and partner, where possible; (d) informing the patients about social aids to adapt their home and encourage them to apply for this aid, as well as how they may request financing for this purpose; (e) providing the individual with SCI with alternative physical capacities to face the problems arising from their disability; (f) preventing potential physical health disorders that can prevent the SCI patient from consuming more analgesics or medication in general; and (g) informing them about possible professional, social and/or recreational activities.

The study has some limitations. The sample size was relatively small ($N = 105$) and thus, the results and conclusions derived from this study must be considered in the light of this limitation. In addition, this is a cross-sectional study and thus, the data only give an image of the moment the measurements were taken. Accordingly, longitudinal studies should be carried out. A more in-depth analysis of the relationship between QoL, daily stress and somatic symptoms is necessary, and other variables should be evaluated in the evolution of QoL in longitudinal studies. Such studies may also be useful to provide future therapeutic and clinical responses (as proposed by Dorstyn, Mathias and Denson, 2011). In

this meta-analysis, the authors concluded that cognitive behavioural therapy is a useful tool to achieve this effect. Hence, it is important to care for and improve the general health of SCI sufferers, as well as to provide a physical environment adapted to their disability.

Conflict of interest

The authors have no conflicts of interest to declare

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