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ARTICLE

Predictors of quality of life of individuals living in Brazil with spinal cord injury/disease

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STUDY DESIGN: A cross-sectional, descriptive study.
OBJECTIVES: To investigate the demographic, clinical behavioral, and rehabilitation predictors of the quality of life (QoL) of people with spinal cord injury/disease (SCI/D) in a middle-income country.
METHOD: Ninety-five participants living in the community were evaluated with the following instruments: World Health Organization Quality of Life - Bref; International SCI Core DataSet; Clinical Interview; Spinal Cord Secondary Conditions Scale and Patient Health Questionnaire; Numerical Pain Intensity Scale; Short-Form 12 Health Survey - Item 8 (how much pain hinders activities); Patient Health Questionnaire 2, Numerical Fatigue Scale. Data were analyzed via Spearman correlation, univariate analysis, and multiple regression to explain the effects associated with quality-of-life predictors.
RESULTS: The main factors that decreased quality of life were fatigue (by 11.5%), depression (by 5.5–12.8%), pain (by 1.3 in total life quality, in the physical domain by 8.6–9.6%), sores (15.6% in the physical domain only). The practice of sports increased the total quality of life by 14.4%, in the physical domain by 11.9%, in the psychological domain by 17.2%, and in the social domain by 23.7%.
CONCLUSIONS: Fatigue, risk of depression, pain, and the presence of sores are predictors of poor quality of life, and sports are a predictor of a better quality of life, for people with spinal cord injury. Multidisciplinary rehabilitation, in addition to policies, to increase accessibility and social inclusion, and incentives or subsidies for the practice of sports could improve QoL following SCI/D.

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INTRODUCTION

According to the World Health Organization (WHO), quality of life (QoL) "*is defined as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and about their goals, expectations, standards, and concerns*" [1]. QoL is referred to as being worse in people with spinal cord injury/disease (SCI/D) than in the general population [2] and may be affected by physical limitations, clinical complications, and psychological and social conditions [2, 3].

Living with SCI/D significantly impacts QoL [2, 3]. Neuropathic pain type and severe pain intensities, which are symptoms demonstrating high prevalence [4], are associated with decreased QoL [5]. Other conditions resulting from SCI/D, including spasticity [6], sphincter incontinence, and bedsores associated or not associated with pain, can adversely affect QoL [2]. Very poor health conditions lower QoL more than the level or severity of injury [3]. Physical limitations, loss of mobility, and dependence have also been found to be associated with worse QoL.

Depression, which has been observed in 18.7–26.3% of SCI/D cases [7], contributes to worse QoL [8, 9] and lower treatment adherence, thus aggravating the general state of health [10]. The difficulty of social inclusion, adaptation to the environment, lack of specialized social assistance, rehabilitation, family support, accessibility, and socio-inclusive structures also negatively impact the quality of life of people with SCI/D [11]. These conditions are worse in lower-income countries [12].

Conversely, better QoL with SCI/D is associated with high self-esteem, a sense of life purpose and self-efficacy, and greater internal coherence [13, 14]. The practice of physical activity/sports improves QoL by gaining physical conditioning and pain diminution [15, 16], as well as due to greater inclusion and social participation [17].

The QoL of people with SCI/D depends on the interaction of several interconnected factors. A better knowledge of these factors can help in the development of best practices and interventions. This is especially important in middle-income countries where incentives, public policies, and health services are scarce. Knowing that the main predictors of Qol can help target resources more effectively. In addition, the importance of the Brazilian data of the SCI/D sample faces the challenge to represent middle-income countries in the SCI/D literature.

This study aimed to evaluate the clinical and behavioral factors, as well as access to rehabilitation, and their influence on the QoL of people with SCI/D living in Sao Paulo, Brazil, which is a median-income country.

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METHODS

Study design

This was a cross-sectional, descriptive study. This study was part of an international multicenter project designed to validate the *International SCI Quality of Life Basic DataSet (SCI-QOLBD)*. Data analyzed in this study represent data collected in Sao Paulo, Brazil. The research ethics committee of the Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo approved the study (no. 1264/2017).

Participants

This study included a convenience sample of 95 participants with SCI/D, aged 46.8 ± 14.7 (19–85) years, from the Spinal Cord Injury Outpatient Clinic of the Division of Physical Medicine of the Institute of Orthopedics and Traumatology of the Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo (IOT-HCFMUSP), and the Brazilian Paralympic Center of São Paulo and the Paralympic training sector of a club in São Paulo. These data were collected from December 2017 to May 2020. Participants lived in the city of Sao Paulo and the surrounding communities.

The following inclusion criteria were used: patients who were over 18 years of age, had spinal cord injury for 12 months or more, were without cognitive or communication impairments (they were able to answer the interviewer's questions), and had signed the informed consent form. Of all ninety-nine patients who were contacted by the researcher, three individuals did not meet the inclusion criteria, and one individual was excluded for not completing the interview.

Survey design

Instruments. The research data were obtained through an individual interview by using the following instruments.

World Health Organization Quality of Life – Bref (WHOQOL-bref): This questionnaire measures general QoL including the four domains of physical and psychological health, social relations, and the environment. The four domain scores denote an individual's perception of quality of life in each domain. The mean score of items within each domain is used to calculate the domain score. The measure is calculated by summing the point values for the questions corresponding to each domain and then transforming the scores to a 0–100-point interval. Domain scores are scaled in a positive direction (higher scores denote higher QoL) [18].

International SCI Core DataSet: This questionnaire was developed by the International Spinal Cord Society (ISCoS) and Spinal Injury Association (ASIA) for the characterization of various participant factors, including demographic data, etiology, the severity of SCI/D, and rehabilitation [19].

Participants were interviewed about their current health conditions and complications of SCI/D, as well as their access to the rehabilitation program.

Spinal Cord Injury Secondary Conditions Scale (SCI-SCS): This scale assesses 16 common health conditions in SCI/D. The items were descriptive, and the values given for each condition ranged from 0–3, with three being the value that indicates the greatest impairment and a worse situation [20].

Numerical pain intensity scale: This scale is a line numbered from zero to 10 (zero indicates no pain and 10 indicates the worst possible pain). Respondents selected the number that described their average pain level in the last seven days [21].

Short Form 12 Health Survey (SF-12): A single item from the SF-12 (item 8) was used. "How much did pain interfere with your normal work (including work outside the home and housework)?". The answers range from 1 - no, not a little, 2 - a little, 3 - moderately, 4 - quiet, and 5 - extremely [22].

Numerical fatigue scale: This scale is a line numbered from one to five, where $1 =$ represents no fatigue and $5 =$ very high fatigue. The number represents the average fatigue level experienced over the last seven days [23].

Patient Health Questionnaire 2 – (PHQ-2): This scale measures depression risk that had occurred in the last 2 weeks before the study. Two questions were asked about "little interest or pleasure in doing things" and "feeling down, depressed or hopeless". The answers range from zero $=$ did not feel on any day, 1 $=$ felt in several days, 2 $=$ felt on more than half the days, 3 $=$ nearly every day [24].

The factors analyzed

Sociodemographic data: age (in years, categorized a posteriori into 19 to 30; 31 to 42; 43 to 59; over 60), gender (man or woman), and education level (in years later grouped into the following categories: Illiterate: 0 years, Elementary I: from 1 to 4 years; Elementary II: from 5 to 9 years; Medium: from 10 to 12 years; Higher: 13 years or more), marital status (dichotomized into with a partner: married; without a partner: single, divorced, or widowed).

Behavioral characteristics: practice sports - exercise intensively 3 times a week or more, for example to prepare for athletics, the Paralympics, or association sports (yes or no).

Lesions characteristics: level and severity of injury (Incomplete paraplegia; complete paraplegia; Tetraplegia: complete tetraplegia or incomplete tetraplegia.), etiology (Traumatic: falls, firearm injuries or traffic accidents; non-traumatic: degenerations, tumors, infections, and Bifida), injury severity (complete or incomplete), time since injury (in years categorized into 1; 2 to 4; 5 to 10; 11 to 20; over 21 years).

Rehabilitation characteristics: rehabilitation (yes or no), time to rehabilitation (in months, categorized into 0 no rehabilitation; 1; 2 to 3; 4 to 6; 7 to 12; over 12 years).

Health conditions: fatigue (no/middle/intense), bedsores (no or yes: No: no bedsores or yes: mild, infrequent, or chronic bedsores), pain in the last seven days (measured on a discrete scale from 0 to 10, 0 means no pain and 10 means pain maximum), pain in the last three months (in the categories: No or little; Mild: mild or occasional; Severe), how much did pain interfere with daily tasks? (In the categories: no interference; slightly; Moderately; a lot; Extremely), risk of depression (score on a scale from 0 to 6, categorized as no risk: score 0; middle: score 1 to 3; high: score 4 to 6.)

Quality of life: (WHOQOL- Bref). 26 questions which range from 1 to 5 points. The worst possible health status corresponds to 1 point, while the best possible corresponds to 5 points. The four domain scores are each converted into a scale from 0 to 100 [25].

Data analysis

The data were evaluated by using "R" (version 3.6) and "RStudio" (version 1.3.1093), and the statistical techniques that were used included "one-dimensional descriptive analysis", "multidimensional descriptive analysis", and "linear regression analysis".

Data were analyzed for symmetry, dispersion, and normal distribution to verify sample adequacy. Correlations and multiple regression to check which variables might interfere in predicting quality of life.

Correlations were analyzed via Spearman's correlation and Coefficient of Determination correlation plots and comparative and correlational tests, with a significance level of 5% throughout the statistical analysis. All the QoL total scores and domains were tested by using the Shapiro–Wilk normality test [26].

The univariate analysis verified the association between each domain's Qol independent and dependent variables by using Pearson's chi-square test (χ2). When the result of this test obtained $p \le 0.20$, the independent variable was selected for the multiple logistic regression model.

Multiple regression analyses were conducted to evaluate the effect of each potential factor or independent variable on QoL. The analyses were performed with models by using total QoL scores as the dependent variable, followed by scores for each of the four QoL domains. Only variables with a significance of $p < 0.05$ were maintained in the model. The Hosmer–Lemeshow test was used to verify whether the model was properly adjusted, and the appropriate model was used to explain the associated factors [27].

RESULTS

Most of the participants were male with a traumatic and incomplete injury. Also, most participants who did rehabilitation did not play sports and did not have bedsores (Table 1).

Table 1. Characterization of the population with Spinal Cord Injury/Disease (SCI/D) according to sociodemographic and clinical data.

	SCI/D patients (N = 95)	
	M SD (range)	n (%)
Sex		
Male		80 (84)
Female		15 (16)
Age	46.8 14.7 (19–85)	95 (100)
19–30		13 (14)
31–40		28 (29)
41–60		38 (40)
60<		16 (17)
Educational level	8.9 4.5 (0–18)	95 (100)
Illiterate		1 (1)
Level I (4 years)		19 (20)
Level II (5 years)		28 (29)
Level middle (3 years)		33 (35)
College (3–6 years)		14 (15)
Marital status		
Married/with partner		46 (48)
Single/divorce/widow		49 (52)
Rehabilitation		
Yes		75 (79)
No		20 (21)
Rehabilitation time - months	6.8 6.9 (1–36)	95 (100)
0		20 (21)
1		6 (6)
2–3		33 (35)
4–6		9 (9)
7–12		18 (19)
12<		9 (9)
Practice Sports		
No		84 (88)
Yes		11 (12)
SCI/D cause		
Traumatic		79 (83)
Non-traumatic		16 (17)
SCI/D time - years	9.1 8.5 (1–34)	95 (100)
1		34 (36)
2–4		8 (8)
5–10		13 (14)
11–20		27 (27)
20<		13 (14)
SCI/D type		
Incomplete		62 (65)
Complete		33 (35)
SCI/D level		
Incomplete Paraplegia		45 (47)
Complete Paraplegia		29 (31)
Incomplete Tetraplegia		17 (18)
Complete Tetraplegia		4 (4)
Pain in the last seven days	4.6 3.2 (0–10)[a]	95 (100)

Table 1. continued

	SCI/D patients (N = 95)	
	M SD (range)	n (%)
Pain in the last three months		
No		32 (34)
Light		20 (21)
Significant		43 (45)
How much did pain interfere with daily tasks		
No		25 (26)
Slightly		21 (22)
Moderately		12 (13)
Quite		27 (28)
Extremely		10 (11)
Bedsores		
No		82 (86)
Yes		13 (14)
Fatigue		
No		25 (26)
Middle		57 (60)
Intense		13 (14)
Depression risk		
No		36 (38)
Middle		45 (47)
High		14 (15)

[a]Pain Punctuation Scale.

The greatest impairment in QoL of people with SCI/D appeared in the physical domain, followed by the environmental domain. The psychological and social domains' averages appeared above the average total QoL (Table 2) (see Supplementary Appendix 1 for participant data).

The correlation analysis showed a negative correlation between pain, fatigue, depression, bedsores, and total QoL included domains (Tables 3 and 4). There was a positive correlation between the pain measures, between pain and fatigue, and between pain and depression. The other data showed a weak or nonexistent correlation.

In Table 5, estimated multiple regression analyses showed that people with SCI/D may report a total QoL score of 68.7% if they did not present with pain, fatigue, or depression. The QoL presence of pain decreased QoL by 1.3%, fatigue by 11.5%, and depression from 5.5% to 12.8%. The practice of sports increased the total QoL by 14.4%.

The impact of the aforementioned factors varied by QoL domain, although intense and medium fatigue affected all domains. Bedsores decreased by physical and social QoL domains by QoL in the physical and social domains by 15.6% and 15.3%, respectively.

In the environmental domain, a marital single status would decrease QoL by 7.6% (Table 4) (see Supplementary Appendix 2 for complete statistical analysis).

DISCUSSION

In this study, physical conditions including pain, bedsores, fatigue, and risk of depression were most associated with lower QoL in people with SCI/D. Conversely, the practice of sports was associated with better QoL [15, 17].

Table 2. Total quality of life score and domains evaluated by the World Health Organization Quality of Life (WHOQOL-bref) in individuals with spinal cord injury.

Variables	Average	Minimal	1st Quartile	Median	3rd Quartile	Maximum	SD	CV
Total Qol	51.3	13.5	42.3	51.9	61.5	81.7	14.1	27.3
Physical domain	44.1	7.1	28.6	42.9	57.1	82.1	18.1	41.0
Psychological domain	53.7	16.7	43.8	54.2	62.5	87.5	14.7	27.3
Social domain	59.5	16.7	41,7	58.3	75.0	100.0	19.7	33.0
Environmental domain	50.2	3.1	40.6	50.0	59.4	84.4	15.1	30.0

QoL Quality of life, *SD* standard deviation, *CV* coefficient of variation.

Table 3. Spearman correlation between variables measures, and scores of variables of Total Quality of Life (QoL) and domains.

QoL domains					
Variables	Total	Physical	Psychological	Social	Environment
Pain in the last three months	−0.44[a]	−0.45[a]	−0.29[a]	−0.25	−0.39[a]
Pain in the last seven days	−0.51[a]	−0.49[a]	−0.32	−0.32[a]	−0.50[a]
Pain interferes with daily tasks	−0.36[a]	−0.44[a]	−0.26[a]	−0.22	−0.30[a]
Fatigue	−0.46[a]	−0.44[a]	−0.48[a]	−0.32[a]	−0.31[a]
Depression	−0.45[a]	−0.37[a]	−0.47[a]	−0.30[a]	−0.33[a]
Age	0.00	−0.08	0.02	−0.02	0.09
Educational level	−0.14	−0.06	−0.17	0.00	−0.22
SCL/D time	0.12	0.20	0.00	−0.07	0.09
Rehabilitation time	0.14	0.17	0.10	0.04	0.12

[a]Correlation >0.25 or <−0.25 significance at the 5% level.

Table 4. Coefficient of determination between categorical and comprehensive explanatory variables between measures, and scores of Total Quality of Life (QoL) and domains.

QoL domains					
Variables	Total	Physical	Psychological	Social	Environment
Pain in the last three months	0.19[a]	0.22[a]	0.10	0.06	0.14
Pain in the last three months[b]	0.18[a]	0.20[a]	0.09	0.06	0.14
Pain interferes with daily tasks	0.17[a]	0.21[a]	0.12	0.10	0.14
Fatigue	0.24[a]	0.20[a]	0.24[a]	0.13	0.16[a]
Depression risk	0.23[a]	0.16[a]	0.21[a]	0.12	0.13
Bedsores	0.15[a]	0.17[a]	0.10	0.16[a]	0.06
Bedsores[b]	0.13	0.14	0.07	0.15[a]	0.04
Rehabilitation[b]	0.04	0.05	0.02	0.00	0.04
Practice sports	0.11	0.13	0.05	0.12	0.05
SCI/D type	0.03	0.06	0.01	0.01	0.01
SCI/D type[b]	0.01	0.03	0.00	0.00	0.00
Educational level[b]	0.07	0.05	0.04	0.06	0.08
Sex	0.02	0.00	0.02	0.01	0.05
SCI/D Etiology	0.05	0.06	0.10	0.07	0.05
SCI/D Etiology[b]	0.00	0.02	0.01	0.01	0.01
Marital status[b]	0.03	0.00	0.02	0.01	0.11

[a]Correlation ≥0.15 significance at the 5% level.
[b]Categorized variable.

Table 5. Estimates of total quality of life and domains evaluated by the World Health Organization Quality of Life (WHOQOL – bref) for the variables studied in spinal cord injuries.

Variables	Estimate (%)	SD	CI	p value
Total QoL (Intercept)	68.7	2.4	[63.9; 73.4]	<0.01
Practice sports	14.4	3.3	[7.9; 21.0]	<0.01
Average fatigue	−11.5	2.5	[−16.4; −6.8]	<0.01
Intense fatigue	−11.5	2.5	[−16.4; −6.8]	<0.01
Depression middle risk	−5.5	2.3	[−10.0; −1.0]	0.02
Depression high risk	−12.8	3.2	[−19.1; −6.5]	<0.01
Average pain in the last seven days	−1.3	0.3	[−1.9; −0.6]	<0.01
Physical domain (Intercept)	63.2	3.2	[56.8; 69.6]	<0.01
Practice sports	17.2	4.5	[8.2; 26.2]	<0.01
Middle fatigue	−11.2	3.3	[−17.8; −4.6]	<0.01
Intense fatigue	−11.2	3.3	[−17.8; −4.6]	<0.01
Pain in the last three mounts: significant	−9.6	3.0	[−15.5; −3.8]	<0.01
Pain interferes with daily tasks	−8.6	3.2	[−15.0; −2.2]	<0.01
Bedsores	−15.6	4.0	[−23.7; −7.6]	<0.01
Psychological domain (Intercept)	68.6	2.4	[63.8; 73.4]	<0.01
Practice sports	11.9	3.7	[4.7; 19.2]	<0.01
Middle fatigue	−12.1	2.8	[−17.7; −6.6]	<0.01
Intense fatigue	−19.6	3.7	[−27.0; −12.2]	<0.01
Depression middle risk	−10.8	2.4	[−15.6; −6.1]	<0.01
Depression high risk	−10.8	2.4	[−15.6; −6.1]	<0.01
Social domain (Intercept)	71.7	3.2	[65.4; 78.0]	<0.01
Practice sports	23.7	5.3	[13.2; 34.2]	<0.01
Middle fatigue	−17.3	3.9	[−25.0; −9.7]	<0.01
Intense fatigue	−17.3	3.9	[−25.0; −9.7]	<0.01
Bedsores	−15.3	4.9	[−24.9; −5.6]	<0.01
Environmental domain (Intercept)	69.0	2.9	[63.2; 74.9]	<0.01
Marital status: single	−7.6	2.5	[−12.6; −2.7]	<0.01
Middle fatigue	−7.1	2.8	[−12.7; −1.4]	0.02
Intense fatigue	−7.1	2.8	[−12.7; −1.4]	0.02
Depression high risk	−8.4	3.5	[−15.4; −1.5]	0.02
Average pain in the last seven days	−1.8	0.4	[−2.6; −1.0]	<0.01

QoL Quality of Life, *SD* Standard Deviation, *CI* Confidence Interval.

Neuropathic pain and severe pain intensities were the factor with the greatest impact on QoL and can influence the quality of life in all domains [5]. The physical suffering of pain causes stress, malaise, discomfort, poor sleep quality [5, 28], and impairs cognitive performance [29]. In addition to worsening the emotional response and interfering with affective and social relationships [21].

The three pain measures used in this study showed a positive correlation between them, evidencing equivalence in the way of measuring pain. Mean pain in the last seven days had the greatest impact on total QoL and on the physical, psychological, and social domains, thus demonstrating the importance of recent pain memory in patients' responses. The other measures were also correlated with the physical domain, but with less impact.

The pain was also associated with worse QoL in patients with incomplete lesions, as neuropathic pain is more frequent in these patients [6, 9]. In the present study, QoL in the physical domain was slightly lower in incomplete injuries, but not significant, and the type of injury was not correlated. A justification for the lower QoL in people with incomplete injuries could be the greater expectation of independence and improvement in the neurological picture, which often does not occur.

Traumatic injuries showed better QoL than non-traumatic injuries, especially in the physical domain. One explanation may lie in the etiology of non-traumatic injuries (such as tumors, infections, and postoperative complications) that usually accompany worse health conditions [6].

Bedsores are one of the worst complications of SCI/D, mainly due to the difficulty of treatment. Specifically, a long stay in ant functional recumbency, healing time, and the impact on general health (malnutrition and infections, necrosis) can result in worse complications. Many bedsores already occur in the acute phase during the hospital stay shortly after the injury and can take weeks or months to heal, delaying the rehabilitation program and predisposing the patient to further complications [2, 3, 6]. In addition, the presence of bedsores further exposes the individual's fragility and dependence, contributing to lower self-esteem. In this work, bedsores worsened QoL in the physical and social domains, possibly due to mobility restriction and difficulty in social interaction, thus contributing to increased stress, irritability, and depression [8, 9].

Psychological QoL was similarly low, closely following the physical and environmental domains. The psychological condition

is closely related to the physical state and vice-versa. The pathway to this may be stress and inflammatory states [30].

A higher risk of depression corresponds to a worse QoL [30]. In this case, in addition to physiological issues, the symptoms of depression themselves make people see everything in a distorted way, in addition to showing a lack of motivation and interest, including in personal care [9, 28], which can lead to low adherence to treatments, aggravating the health framework [10]. Patients with SCI/D who have been treated for depression have improved QoL scores [9].

Other psychological characteristics such as the ability to face adverse situations, resilience, and tolerance to frustration when found in SCI/D can improve quality of life [16, 30]. These psychological characteristics can be stimulated by interdisciplinary care, encouraging self-efficacy, and adjusting to new living conditions, reinforcing the importance of psychological support programs and interdisciplinary rehabilitation [30].

The patients in this study who underwent a rehabilitation program had higher QoL scores in the physical domain, thus showing their importance in coping with disability [6, 12, 16].

The practice of sports was identified in this sample as an influential factor in improving QoL, especially in the social domain. Individuals who practiced sports reported medium-intensity fatigue but were not at risk of depression and had the highest QoL scores. It can be speculated, in this case, that fatigue is physiological due to the greater stress of physical activity, but that it did not interfere in the assessment of QoL of athletes, unlike non-athletes. Participation in sports improves physical fitness, promotes autonomy, including improved mood and well-being, and improves secondary health conditions including pain [15, 17]. A more active life improves psychological conditions, decreases the risk of depression, and promotes greater inclusion and social participation [17]. The most attractive aspect of this result is that the practice of sports promotes improvement in all domains of QoL, causes few adverse events, and can be indicated for most patients [15].

Although these findings are interesting, it is worth noting that the group of athletes in the sample was small; in addition, they were male, without bedsores and with a rehabilitation program, therefore, more studies are needed to demonstrate the effect of sports practice on QoL of SCI/D, but the evidence is favorable.

CONCLUSION

This paper examines correlates of QoL in a community, cross-sectional sample of persons with SCI/D in Brazil. It also provides an opportunity to explore potential QoL predictors in a sample under-represented in the SCI literature.

In our results, fatigue, bedsores, risk of depression, and pain are predictors of poor quality of life while sports practice is a better predictor that shows the importance of interdisciplinary interventions with the same goals in the rehabilitation of patients with SCI/D. A fragmented vision can contribute to inadequate care (polypharmacy and iatrogenic), aggravating disabilities, creating unattainable expectations, and wasting resources. Thus, a good health system with rehabilitation focused on biopsychosocial aspects with specific support that includes mental attention and sports practice is essential. However, the measures must also be adjusted to the possibilities of the region, but political measures to increase health resources, accessibility, and social inclusion are fundamental to the objective of offering the best possible care.

STUDY LIMITATIONS

The limitations of the study were related to the increased complexity of the concept of QoL, which is multifactorial and involves well-being and biopsychosocial, cultural, and spiritual conditions. However, the QoL assessment was performed with tools that have been validated in the physical, psychological, social, and environmental domains, and it was able to identify the most important factors that affect QoL in individuals with SCI/D.

The requirement of attendance at the site (university hospital/ club/sports center) for the interviews may have contributed to selecting only individuals in better social, economic, and mobility conditions, and it did not those unable to access health services due to poor mobility/illness, it which may have influenced the results.

DATA AVAILABILITY

The data generated and analyzed during this study or additional data are available from the corresponding author or within the published article and its supplementary files.

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AUTHOR CONTRIBUTIONS

AASNC and JG conceptualized and designed the study. AASNC and CW collected data which was then analyzed and interpreted by AASNC and JG. AASNC drafted the manuscript, and JG, ACA, DGT, and CW critically revised and approved the final article. All authors read and approved the final manuscript.

COMPETING INTERESTS

The authors declare no competing interests.

ETHICAL APPROVAL

The research ethics committee of the Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo approved the study (no. 1264/2017).

ADDITIONAL INFORMATION

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