

# Social Reintegration and Quality of Life after Spinal Cord Injury: the Greek Paradigm

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## Abstract

Previous studies reported on social reintegration (SR) of spinal cord injury (SCI) patients at their own countries. Their results on community accessibility, SR and ability to enter the labor market, and quality of life (QoL) varied. Therefore, we performed this study to evaluate SR and QoL of SCI people who have completed their rehabilitation program in Greece, and to correlate these findings with the demographic characteristics of the participants, as well as with the clinical parameters associated with SCI.

We retrospectively studied 164 patients with SCI (129 men, 35 women; mean age, 46 years; range, 20-80 years) who completed their rehabilitation program and lived in the community in Greece. Mean time from SCI was 15 years (range, 1-43 years). All participants completed questionnaires in an interview form. Questionnaires included demographic details and clinical information, pain score in a 0-10 point pain scale, CHART scale to assess SR, and the WHOQoL BREF scale to assess QoL. Univariate predictors for SR and QoL varied. Multivariate predictors for SR and QoL were gender, educational level, employment, type of SCI, presence of pressure ulcers, age for all domains except for economic self-sufficiency and environment, time elapsed from SCI, and pain for all domains except for physical independence and general health.

Patients with SCI in Greece experience similar SR and QoL with other European countries, except for community accessibility and ability to enter the labor market which is more adverse in Greece than in the other European countries.

Key words: Spinal cord injury; Social reintegration; Quality of life; Greece.

## Introduction

World Health Organization recognizes social reintegration (SR) as a very important parameter of patients with disability after the acute phase [1]. The psychological and social consequences of a Spinal Cord Injury (SCI) are evident in both the acute and chronic phases of injury, and have the potential to influence patients' reintegration into the community [2]. The loss of friends and family after disability can

produce greater social isolation than the isolation due to lack of access to environmental resources [3].

Spinal cord injury leads to alterations in ambulatory, cardiovascular, hand and many other bodily functions that affect quality of life (QoL). An assessment of SCI outcomes should therefore include patient-reported QoL outcomes as well as the standard clinical and functional outcomes [4]. As

noted by Glass et al. [5], QoL can be described as an estimation of happiness or satisfaction with subjective and objective aspects of life that are important for an individual [5]. QoL should include both subjective appraisals of one's situation as well as objective and observable aspects, such as limitations imposed on an individual by environmental barriers [6]. Measuring health-related QoL can also form the basis for cost-effectiveness or cost-utility studies and longitudinal studies of clinical recovery [4].

Reintegration, as defined by Stiens et al. [7], "...extends beyond the person: it promotes his/her fullest inclusion and participation within the physical and psychosocial environment". Achieving a higher level of SR contributes to better overall adjustment and QoL [8]. The goal of rehabilitation is to promote the acquisition or resumption of culturally and developmentally appropriate social roles after injury or illness [9]. Understanding the importance of social participation and integration of persons with disabilities is important, because their subjective understanding will eventually guide their behaviors, which aim at optimizing participation and integration [10].

Previous studies reported on SR of SCI patients at their own countries [2,3,11-14]. Various factors, including age, gender, marital status, level of injury, employment, education and presence of pain were examined; results were similar in European countries. However, results on community accessibility, SR and ability to enter the labor market, and QoL have been conflicting. This study attempted to evaluate SR and QoL of patients with SCI, who have completed their rehabilitation program in Greece, and to investigate in which way these findings correlate with the demographic characteristics of the participants, as well as with the clinical parameters associated with SCI and its complications. This study enhances the literature regarding SR and QoL of SCI people, taking into account the specific cultural and socioeconomic characteristics of different countries, and would be useful for comparison with other populations, for the scientific community and the treating physicians of SCI people.

## Materials and Methods

We retrospectively studied 164 Greek patients with SCI of any cause, who had completed their rehabilitation program in Greece and lived in the community, including urban (104 patients), suburban (33 patients) and rural (27 patients) areas. In Greece, it is estimated that approximately 9200 people with SCI live in the community. The sample consisted of three types of SCI individuals: a) people who have been

hospitalized in the past in the five largest rehabilitation centers of the country, either public or private, b) people who visited these centers for medical assistance or any other use of their services on an outpatient basis, c) members of associations of patients with SCI all over the country. There were 129 men and 35 women with a mean age of 46 years (range, 20-80 years). The mean time from SCI was 15 years (range, 1-43 years). Patients' data were retrieved by filling the questionnaires during a face to face interview and physical examination at the time of the study in order to update their clinical characteristics. The mean pain score, as measured by the Numeric Rating Scale, was 4 points (range, 0-10 points). Discrimination of nociceptive and neuropathic pain was done based on past medical history and clinical examination. All patients gave written informed consent for their data to be included in this study. The study was approved by the Institutional Review Board/Ethics Committee of the authors' institutions.

## Questionnaires

All participants completed questionnaires in an interview form. The study questionnaires included demographic details and clinical information (Table 1), the CHART (Craig Handicap Assessment and Reporting Technique) scale to assess SR, and the WHOQoL (World Health Organization Quality of Life) BREF scale to assess QoL. The poverty level data required for the CHART economic sufficiency domain was obtained after permission from the National Statistical Service of Greece.

CHART has been identified as a useful tool for assessment of SR of patients with SCI [15-17]. It quantifies the extent to which people fulfill various social roles, focusing on observational criteria rather than on subjective interpretation. CHART evaluates six separate subscales: Physical Independence, Cognitive Independence, Mobility, Occupation, Social Integration and Economic Self-sufficiency. The subscale of Physical Independence assesses how much assistance an individual needs and takes into account those who are able to self-administer their own care as being more independent than those who cannot. The subscale of Cognitive Independence assesses the amount of assistance needed for cognitive functions such as remembering, decision making, and judgment. The subscale of Mobility assesses the ease with which a person can physically move within his or her environment. The subscale of Occupation assesses how productively do individuals use their time, including school, work, household, volunteer activities and hobbies, but does not include activities such as watching television or sleeping. The subscale

of Social Integration assesses how extensively an individual interacts with others. The subscale of Economic Self-sufficiency assesses the ability to maintain customary financial independence. Scoring is based on the degree of participation, with higher scores indicating greater community integration and less handicap. CHART produces a total score as well as subscores for the six subscales. The score scale ranges from 0 to 100; scores <100 indicate less than full integration in the community [5].

WHOQoL project was initiated in 1991 aiming to develop an international cross-culturally comparable QoL assessment instrument [14]. It assesses the individual's perceptions in the context of their culture and value systems, as well as their personal goals, standards and concerns [18]. The WHOQoL BREF is the shorter version of the original instrument. It comprises 26 items that measure five broad domains: general health, physical capacity, psychological well-being, social relationships, and environment. It is more convenient for use in large research studies or clinical trials [19,20].

**Table 1.** Details of SCI patients included in this study.

Variables		N (%)
Gender	Male	129 (78.7)
	Female	35 (21.3)
Educational level	Primary education	35 (21.3)
	Secondary education	93 (56.7)
	Tertiary education	27 (16.5)
	Postgraduate education	9 (5.5)
Work status	Unemployed	18 (11)
	Working	34 (20.7)
	Pensioner	101 (61.6)
	Student	7 (4.3)
	Home-making	4 (2.4)
Type of SCI	Paraplegia	120 (73.2)
	Quadriplegia	44 (26.8)
AIS	A	97 (59.1)
	B	22 (13.4)
	C	25 (15.2)
	D	20 (12.2)
Type of pain*	No pain	62 (37.8)
	Nociceptive	30 (18.3)
	Neuropathic	55 (33.5)
	Nociceptive and neuropathic	17 (10.4)
Pressure ulcers	Yes	29 (17.7%)
	No	135 (82.3%)

AIS: ASIA Impairment Scale; \*measured with the Numeric Rating Scale; discrimination of nociceptive and neuropathic pain was based on the medical history and clinical signs of the patients, and the localization of pain

## Statistical analysis

Data was expressed as means  $\pm$  standard deviation (SD) for continuous variables and as percentages for categorical parameters. Normality of distribution of variables was assessed with the

Kolmogorov-Smirnov test and the normal probability plot. Bivariate analysis was made using the Student's t-test and the One-way ANOVA model to analyse the relation between the dependent variable (questionnaires scores) and the qualitative parameters. Pearson's correlation coefficient was used to assess the relation between each dependent variable and the quantitative parameters. Multiple linear regression analysis with enter method was performed for a multivariate summary model of determinants for each outcome variable. Results were based on the multivariate analysis; a *p*-value of <0.05 (two sided) denoted statistical significance. All analyses were performed using the statistical package SPSS version 17.00 (Statistical Package for the Social Sciences, SPSS Inc., Chicago, Ill., USA).

## Results

Overall, participants scored 84.4 $\pm$ 22 points in the CHART physical independence domain, 77.3 $\pm$ 16.2 points in the cognitive independence domain, 78 $\pm$ 24.2 points in the mobility domain, 44.1 $\pm$ 35.5 points in occupation domain, 92.6 $\pm$ 13.6 points in the SR domain, and 72.6 $\pm$ 29.7 points in the economic self-sufficiency domain. Participants scored 63.2 $\pm$ 26.1 points in the WHOQoL BREF general health domain, 66.7 $\pm$ 20.2 points in the physical capacity domain, 71.6 $\pm$ 19.9 points in the psychological well-being domain, 60.4 $\pm$ 23.5 points in the social relationships domain, and 64.8 $\pm$ 16.8 points in the environment domain.

## Univariate analysis

Gender had a statistically significant correlation with occupation (*p*= 0.063) and mobility (*p*= 0.013). Women exhibited a better vocational rehabilitation after SCI compared with men, while men achieved a higher degree of accessibility in their environment. Marital status had a statistically significant correlation with cognitive independence (*p*< 0.0005) and mobility (*p*= 0.001) domains; unmarried persons exhibited higher SR in terms of cognitive independence and mobility. Educational level had a statistically significant correlation with occupation (*p*<0.0005), and physical capacity (*p*= 0.054), social relationships (*p*= 0.044), cognitive independence (*p*= 0.001) and economic self-sufficiency (*p*= 0.017); tertiary education graduates had better QoL with respect to physical condition and social relationships and better SR in labor market participation, economic resources and cognitive independence. Employment had a statistically significant correlation with physical capacity (*p*= 0.001), psychological well-being (*p*= 0.078), social relationships (*p*= 0.008), mobility (*p*<

0.0005), occupation ( $p < 0.0005$ ), SR ( $p = 0.008$ ), cognitive independence ( $p = 0.022$ ), and economic self-sufficiency ( $p = 0.020$ ); SCI people who were either working or studying in order to enter the labor market had better QoL and SR compared to those seeking work or already retired. Type of spinal cord injury (paraplegia or quadriplegia) had a statistically significant correlation with physical capacity ( $p = 0.051$ ), physical ( $p < 0.0005$ ) and cognitive independence ( $p = 0.006$ ); paraplegics outscored the quadriplegic SCI people. Presence of pressure ulcers had a statistically significant correlation with general health ( $p = 0.020$ ) and SR ( $p = 0.013$ ). ASIA severity of injury and type of micturition (normal or intermittent self-catheterizations) did not have a statistically significant correlation with QOL or SR. Economic self-sufficiency had a statistically significant correlation with all domains of QoL ( $p < 0.005$ ); this suggests that ensuring a higher degree of financial resources provides for a better QoL. The place of residency had a statistically significant correlation with economic self-sufficiency ( $p = 0.053$ ); residents in urban areas had a greater economic independence

than those who live in suburban or rural areas.

Age had a statistically significant correlation with all domains of CHART except for economic self-sufficiency ( $p = 0.356$ ), and with all domains of WHOQoL BREF except for general health ( $p = 0.081$ ) and environment ( $p = 0.287$ ); as age increases, it adversely affects the SR and QoL sections assessed by these scales. Time elapsed from SCI had a statistically significant correlation with the general health ( $p = 0.060$ ), occupation ( $p = 0.009$ ) and economic self-sufficiency ( $p = 0.001$ ); as time passes, the person's self-perception of health and SR improve. Pain had a statistically significant correlation with all domains of CHART except for economic self-sufficiency ( $p = 0.062$ ) and all domains of WHOQoL BREF; statistically significant correlation was not with the type of pain (nociceptive or neuropathic), but with its intensity, which is as the pain increased, QoL and SR were declining. However the coexistence of nociceptive and neuropathic pain had statistical significant negative effect to physical capacity ( $p < 0.0005$ ) and psychological well-being ( $p = 0.032$ ) (Tables 2 and 3).

**Table 2.** CHART findings and comparison of variables.

Variables	Physical independence (mean±sd, PCC, P-value)		Cognitive independence (mean±sd, PCC, P-value)		Mobility (mean±sd, PCC, P-value)		Occupation (mean±sd, PCC, P-value)		Social integration (mean±sd, PCC, P-value)		Economic self-sufficiency (mean±sd, PCC, P-value)	
Male	84.9±21.3	0.632	78.3±15.5	0.118	80.6±23.1	0.013	41.4±35	0.063	93.4±12.6	0.222	73.3±29.8	0.567
Female	82.9±24.6		73.5±18.4		68.2±26.1		54±36.1		89.7±16.7		70±29.6	
Un-married	87.1±21.5	0.113	82.4±13.6	<0.0005	83.9±19.5	0.001	48.5±35.2	0.100	93±14	0.730	70.9±30.3	0.455
Married	81.6±22.3		71.8±17		71.7±27.1		39.4±35.4		92.3±13.2		74.4±29.1	
Primary education	78.8±26.9	0.226	68.5±16.8	0.001	64.1±29.4	<0.0005	32±36	<0.0005	90.4±14.4	0.324	63.6±31.7	0.017
Secondary education	86±19.4		79.4±15.3		81±21.5		39.7±33		92.5±14		71.8±30.2	
Tertiary education	86.1±22.8		80.5±15.4		83.6±20.5		67.4±31.4		95.2±11.6		83.3±23.2	
Non-working	84.1±22.3	0.680	75.8±16.8	0.022	74±25.3	<0.0005	33.7±30.3	<0.0005	91.1±14.5	<0.0005	69.8±29.5	0.020
Working/Students	85.8±21		82.9±12.3		93.3±9.5		83.9±24.3		98.6±6.2		83.1±28.7	
Paraplegia	88.5±18.3	<0.0005	79.4±15.5	0.006	78.4±23.9	0.744	46.5±35.2	0.156	93.1±13.2	0.462	71.5±30.1	0.434
Quadriplegia	73.4±27		71.6±16.8		77±25.2		37.6±36		91.3±14.8		75.6±28.8	
AIS A	84±23.6	0.405	78.6±15.7	0.105	78.7±23.4	0.102	44.6±36	0.408	93.9±11.8	0.244	75.5±28.2	0.434
AIS B	85.4±21.3		80.6±15.4		85.1±21.3		51.8±38.4		94.1±12.8		72.7±31.7	
AIS C	80.1±23.1		70.2±16.8		67.1±29		44.3±33.5		89.2±14.7		72±31.7	
AIS D	91.2±8.9		75.9±17.5		80.3±21.6		33.3±32.3		89±19.6		68.8±30.7	
No pain	88.8±15.9	0.194	81.3±14.2	0.018	83.3±20.1	0.020	50.9±35.3	0.205	95.6±10.4	0.110	75.5±28.2	0.459
Nociceptive pain	82±25		74.8±16.7		72±26.8		37.6±29.9		91.7±12.7		72.7±31.7	
Neuropathic pain	82.9±24.3		76.9±15.5		79.2±23.7		43.1±36.8		91.4±15.2		72±31.7	
Both types of pain	77.7±26.3		68.2±20.9		65.2±29.2		34.3±39.3		87.5±18.1		68.8±30.7	
Age	r = -0.182	0.019	r = -0.398	<0.0005	r = -0.455	<0.0005	r = -0.220	0.005	r = -0.248	0.001	r = -0.073	0.356
Time (years) from SCI	r = 0.028	0.719	r = 0.149	0.082	r = 0.106	0.178	r = 0.204	0.009	r = 0.047	0.548	r = 0.264	0.001
Pain	r = -0.166	0.033	r = -0.248	0.001	r = -0.224	0.004	r = -0.182	0.019	r = -0.217	0.005	r = -0.146	0.062

PCC: Pearson's correlation coefficient; AIS: ASIA Impairment Scale

**Table 3.** WHOQoL findings and comparison of variables.

Variables	General Health (mean±sd, PCC, P-value)		Physical Capacity (mean±sd, PCC, P-value)		Psychological well-being (mean±sd, PCC, P-value)		Social Relationships (mean±sd, PCC, P-value)		Environment (mean±sd, PCC, P-value)	
Male	63.3±25.8	0.933	66.3±20.5	0.645	72±19.5	0.622	60.9±23.5	0.612	64.8±17.2	0.920
Female	62.9±27.7		68.1±18.9		70.1±21.4		58.6±23.9		65.1±15.4	
Unmarried	62.1±25.7	0.568	67.1±19.4	0.794	71.4±18.7	0.833	60.5±22.6	0.945	65.3±17.1	0.750
Married	64.4±26.6		66.2±21.1		71.8±21.2		60.2±24.6		64.4±16.5	
Primary education	58.9±26.9	0.539	61±19.3	0.054	67±18.6	0.107	54.1±21.2	0.044	62.4±18.1	0.209
Secondary education	64±26.8		66.5±20.8		71.1±21.5		59.9±25		64.1±17.6	
Tertiary education	65.3±23.6		72.5±18.2		77.3±15.5		67.8±20		69±12.5	
Non-working	63.8±26.8	0.590	64.5±20.8	0.001	70.2±20.5	0.078	57.9±23.8	0.008	64.1±17.2	0.235
Working/Students	61±23.6		75.1±15		77±16.7		69.9±19.9		67.9±14.9	
Paraplegia	64.9±24.4	0.212	68.8±18.3	0.051	73.2±18.6	0.123	59.9±23.8	0.699	65.4±17.2	0.525
Quadriplegia	58.5±30.1		60.9±23.9		67.2±22.7		61.5±23		63.5±15.5	
AIS A	63.7±25.7	0.836	67.9±18.9	0.539	72.3±18.8	0.409	60.1±23.6	0.972	64.8±15.5	0.754
AIS B	65.9±24.5		68.7±23.8		73.3±21.2		62.5±20.7		61.8±22.2	
AIS C	62.5±25.5		64±19.4		73.2±18.6		59.3±26.8		66.3±17.8	
AIS D	58.8±31.7		61.8±22.9		64.6±25		60.4±23.2		66.9±15.1	
No pain	65.5±24.5	<0.0005	74±16.8	<0.0005	72.5±18.6	0.032	65.6±22.7	0.081	68.1±16.2	0.082
Nociceptive pain	62.9±25.5		63.6±18.8		71.4±17.5		54.2±23.4		66.9±16.1	
Neuropathic pain	63.4±26.2		64.8±18.9		74.7±18.9		60.5±23.2		62.3±16.7	
Both types of pain	54.4±32.5		51.5±26.9		58.6±27.3		52±24.8		57.9±17.9	
Age	r= -0.137	0.081	r= -0.216	0.005	r= -0.237	0.002	r= -0.305	<0.0005	r= -0.084	0.287
Time (years) from SCI	r= 0.147	0.060	r= 0.127	0.105	r= 0.102	0.194	r= 0.064	0.415	r= 0.189	0.015
Pain	r= -0.174	0.026	r= -0.416	<0.0005	r= -0.173	0.027	r= -0.278	<0.0005	r= -0.256	0.001

PCC: Pearson's correlation coefficient; AIS: ASIA Impairment Scale

### Multivariate analysis

Gender had a statistically significant correlation with occupation ( $p=0.012$ ), mobility ( $p=0.002$ ) and SR ( $p=0.033$ ). Educational level had a statistically significant correlation with occupation ( $p=0.038$ ). Employment had a statistically significant correlation with physical capacity ( $p=0.025$ ), mobility ( $p<0.0005$ ), occupation ( $p<0.0005$ ), and SR ( $p=0.008$ ). Type of spinal cord injury (paraplegia or quadriplegia) had a statistically significant correlation with physical capacity ( $p=0.002$ ), psychological well-being ( $p=0.038$ ), physical ( $p<0.0005$ ) and cognitive independence ( $p<0.0005$ ), and occupation ( $p=0.002$ ). Presence of pressure ulcers had a statistically significant correlation with general health ( $p=0.032$ ) and SR ( $p=0.001$ ).

Age had a statistically significant correlation with all domains of CHART except for economic self-sufficiency ( $p=0.280$ ), and with all domains of WHOQoL BREF except for environment ( $p=0.264$ ). Time elapsed from SCI had a statistically significant correlation with the general health ( $p=0.018$ ), psychological well-being ( $p=0.033$ ), cognitive independence ( $p<0.0005$ ), mobility ( $p=0.003$ ), occupation ( $p<0.0005$ ) and economic self-sufficiency ( $p=0.004$ ). Pain had a statistically significant

correlation with all domains of CHART except for physical independence ( $p=0.075$ ), and with all domains of WHOQoL BREF except for general health ( $p=0.153$ ).

### Discussion

SCI affects QoL through alterations in body functions [4-6]. The goal of rehabilitation is to promote the acquisition or resumption of culturally and developmentally appropriate social roles after injury or illness [9]. Understanding the importance of social participation and reintegration of persons with disabilities is important, because their subjective understanding will eventually guide their behavior, which aims at optimizing participation and integration [10]. Achieving a higher level of SR contributes to a better QoL [8]. In the present study, we evaluated SR and QoL of SCI patients who have completed their rehabilitation program in rehabilitation centers in Greece, aiming to correlate these findings with the demographic characteristics of the participants, as well as with the clinical parameters associated with SCI and its complications. Our results were similar to those reported for other European countries [2,11], with the exception of those related to mobility and occupation. In these cases, SCI patients in Greece seem to have significant limitations

in the fields of movement ability and accessibility (roads, buildings, transportation, and others), and their opportunities to be engaged in work.

In Greece, since 2000, legislation requires the application of international accessibility principles in existing buildings and in public pedestrian traffic. However, despite the great progress made in recent years in the field of accessibility, people with disabilities still face major obstacles in their daily living, particularly in public transport, restaurants, sports and recreation facilities, moving within the community, and accessing cash money machines. The World Health Organization emphasizes the importance of social attitudes, architectural characteristics as well as legal and social structures in relation to social participation and SR of people with disabilities [1]. Although the ability of people using wheelchairs to participate in the social environment has recently been significantly improved through changes in transportation systems, much remains to be done, especially in the areas of physical and social accessibility. However, as the present study showed, in SCI people in Greece, environmental factors did not appear to be important predictors of SR and QoL; probably, other factors such as family support, self-esteem and information support are of greater significance [21].

Gender and marital status should probably be considered important factors for SR and QoL of patients with SCI [3,12,13,22-25]. Most studies reported that women with SCI exhibit a lack of vitality and vigor [12], and have a higher proportion of medical, social and psychological problems [13], which explains their decreased participation in educational, voluntary and recreational activities [3]. The present study also showed that women exhibited a lower degree of accessibility in the physical and social environment compared to men. Other studies reported that married people with SCI have less depression, greater psychological well-being and better QoL [23,24], due to the improved social participation that the status of marriage provides [25]. In the present series, the marital status partially affects social reintegration; married people with SCI have less cognitive independence and transfers ability. This result can be explained by the motivation of unmarried people to live carefree and their tendency to develop abilities to achieve various tasks.

The beneficial effects of education on SR and QoL have been well-reported [26-30], and confirmed in the present series. Educational training of patients with SCI facilitates job finding, especially jobs with higher earnings, which gives them access to goods and delights [26], promotes SR [27,28], increases

confidence and self-efficacy [29], and improves QoL [29]. Employment has a positive effect on QoL, as it improves a person's ability to develop social relationships, to interact with his community and to pass his/her time in productive and socially normal roles [12,14,31,32]. However, in the present series, only 20.7% of respondents declared having a profession, which is a very low number taking into account that their average age was 46 years, and 78.7% of them had average or higher education; all of them were beyond 20 years of age, which is the median age of entering labor market in Greece. This finding should be explained by the high unemployment rate in Greece during data collection that exceeded 27% due to financial crisis. Additionally, 61.6% of patients with SCI in this series declare themselves as pensioners, although they actually receive disability benefits; only 23.2% of these people were 58 years of age or above, which is the median age of retirement in Greece. This is explained by the existing benefit policies in Greece, according to which the ease of retirement of people with disabilities and the problems of accessibility, lead SCI people to opt for retirement instead of remaining into the workforce.

Age has an important role in SR and QoL of SCI people [11,22,32,33]; it seems to adversely affect QoL by deteriorating health level, because of multiple co-morbidities in the elderly, increasing fatigue and disability [11,33]. However, other authors reported that aging is a factor conducive to achieving SR [22,32]. Probably, this had to do with aging of the person from the time of SCI. Conflicting results have been reported regarding the effect of time from SCI on psychology and self-perception of people with SCI; some authors found a positive effect [12,26], while others did not observe any significant correlation [33,35]. In this series, we found that psychology and self-perception of health state of people with SCI improve with time from SCI and that time from SCI exerts a beneficial effect in SR related to cognitive independence, mobility, occupation and economic self-sufficiency. Conflicting results have also been reported regarding the type of SCI, SR and QoL [11,22,33]. In line with most of the reported studies [11,33], as expected, the present study found that paraplegics have higher SR and QoL, obviously because of higher self-service ability, lower mobility difficulties and therefore difficulties to participate in work and other leisure and social activities in the community.

In line with the related literature [12,34-36], we also found that the occurrence of pressure ulcers affects adversely both SR and QoL with an impact on

self-care, transportation, self-esteem [34], physical and social functioning [14], functional independence at home, work and daily activities [35], and probably on mental health [36]. We concur with previous reports that the type of micturition (normal or intermittent self-catheterization) is an important factor for returning to work after SCI [37]; SCI people who are self-catheterized have negative emotions, face physical and social activity constraints and exhibit reduced QOL indicators [12]. However, in contrast to these reports [12,37], the present study did not find a significant correlation with the type of bladder catheterization of SCI people in Greece.

Concerning residency location, our study found it does not affect the quality of life of SCI individuals. In line with previous reports [36,38], we found that residency type had a statistically significant correlation with economic self-sufficiency ( $p = 0.053$ ); residents in urban areas had a greater economic independence and level of life satisfaction compared to those living in suburban or rural areas. Obviously, a higher degree of financial resources for SCI people creates more favorable conditions and provides for a better QoL [36,38]. This is indirectly attributed to increased comorbidity, complications and pain level of people with low socioeconomic background and low access to medical health care systems [38]. In this study, approximately 2/3 of the participants experienced pain of variable intensity. Pain should be considered a negative predictor for QoL and SR as it has been associated with sleep, mood, mobility and self-care difficulties [39], increased possibility of developing depression that in turn restricts both life satisfaction and willingness to participate in social activities [40], and reduced participation in recreational and leisure activities [39].

## Conclusion

Employment, education, economic self-sufficiency, time from SCI, pain, aging, quadriplegia, and presence of pressure ulcers are important predictors of SR and QoL in a selected population of SCI patients in Greece. Overall, these patients in Greece experience similar SR and QoL with other European countries, except for community accessibility and ability to enter the labor market which is more adverse in Greece than in other European countries.

## Competing Interests

No benefits have been or will be received from a commercial party related directed or indirectly to the subject matter of this article.

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