

From Disability to Inclusion: The Impact of Sports on Quality of Life in Participants with Physical Disabilities (Paraplegia)

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Abstract

This cross-sectional study investigated the relationship between sports participation and quality of life among individuals with paraplegia (N=30). Participants with injury levels T5-L5 were divided into trained (n=15) and untrained (n=15) groups. Quality of life was assessed using the validated Arabic Short Form-36 (SF-36), while functional independence was measured using the Functional Independence Measure (FIM). Statistical analysis revealed significantly higher scores across all SF-36 dimensions in the trained group (M=93.77, SD=2.76) compared to the untrained group (M=42.24, SD=15.53; $p<0.001$). Strong positive correlations were observed between Mental Health and Cognitive Performance components ($r=0.959$, $p<0.001$) and between total SF-36 and FIM scores ($r=0.840$, $p<0.001$). These findings suggest that regular sports participation may enhance both quality of life and functional independence in individuals with paraplegia.

Keywords: sport, quality of life, physical disabilities.

1. Introduction

Physical disability represents a significant global health challenge, affecting approximately 15% of the world's population, with prevalence rates varying notably between socioeconomic contexts - 11.8% in higher-income nations and 18% in lower-income regions (WHO, 2024). Beyond immediate physiological limitations, individuals with physical disabilities face increased risks of secondary health complications, particularly when physical inactivity persists. These complications include metabolic syndrome, cardiovascular diseases, and musculoskeletal disorders, which can create a cycle of declining health outcomes and compromised functional independence (Kelley et al., 2012).

Adaptive Sports participation has emerged as a comprehensive intervention strategy addressing these challenges through multiple evidence-based mechanisms. Systematic reviews and meta-analyses have documented significant improvements across interconnected domains of health and well-being. From a physiological perspective, supervised physical activity improves body composition, cardiovascular fitness, and functional capacity among individuals with spinal cord injuries (Neto & Lopes, 2015). The psychological benefits of adaptive sports participation are equally substantial, correlating with enhanced mental resilience, reduced depression symptoms, and improved life satisfaction (Isidoro-Cabañas, 2023). Furthermore, regular sports engagement facilitates community participation, strengthens peer relationships, and supports socio-professional reintegration, contributing to overall quality of life enhancement (Chen, 2024).

Despite these documented benefits, participation rates in adaptive sports remain disproportionately low compared to the general population. This disparity is particularly notable in Tunisia, where limited research has investigated the comprehensive impact of sports participation on individuals with paraplegia. The few existing studies suggest

positive outcomes in functional capacity optimization and socio-professional reintegration (Tlili et al., 2008), but a significant gap remains in understanding population-specific outcomes and barriers to participation.

The present study addresses this research gap by examining the relationship between sports participation and quality of life among Tunisian individuals with paraplegia. This investigation aims to quantify the impact of regular sports participation on quality-of-life measures, evaluate the relationship between sports engagement and functional independence, and assess the interaction between physical activity and psychosocial well-being in this population. Through this comprehensive analysis, the research contributes to the growing body of evidence supporting adaptive sports programs while providing culturally specific insights for rehabilitation professionals and policymakers in Tunisia and similar contexts. Understanding these relationships may inform the development of more effective rehabilitation strategies and support services for individuals with paraplegia.

2. Method

2.1 Study Design

This cross-sectional study was conducted over a three-month period at three major medical centers in Tunisia: The Physical Medicine and Rehabilitation Service of the Mohamed Kassab National Orthopedic Institute (INOMK), the Professional Reintegration Center for Motor Disabilities (CRPHMAV), and the National Center for Medicine and Sports Sciences (CNMSS).

2.2 Participants

Thirty participants with paraplegia were recruited through convenience sampling and divided equally into two groups. The trained group ($n = 15$) consisted of individuals who regularly engaged in organized sports activities, participating in at least 3 sessions per week for 6 months or more. The untrained group ($n = 15$) included individuals with no regular sports participation. To be included in the study, participants had to meet several criteria: they needed to be between 20-40 years of age, have a stable neurological condition, have an injury level between T5 and L5, and have sustained their injury at least one year prior to the study.

Table 1. Classification according to the ASIA levels between the 2 groups.

		ASIA A	ASIA B	ASIA C	ASIA D	ASIA E	P
Groups	Trained	12	2	1	0	0	
	Untrained	12	2	1	0	0	1

The data presented in Table 2 show that there are No significant difference in the level of cord injury between the two groups ($p > 0.05$). Moreover, the injury level is between T5 et L5 and most of the injury are thoracic.

Table 2. The level of injury for the two groups.

		Level of cord injury		P
		Thoracic (T5-T12)	spine (L1-L5)	
Groups	Trained	13	2	0,62
	Untrained	12	3	

2.3 Procedure

Data collection encompassed comprehensive clinical evaluations and validated assessment instruments. Sociodemographic characteristics, including sports participation patterns and paraplegia-specific variables, were obtained through structured questionnaires. Quality of life assessment was conducted using the validated Arabic version of the Short Form-36 (SF-36) health survey (Guermaz et al., 2012). Neurological injury severity was classified according to the American Spinal Injury Association (ASIA) Impairment Scale standardized assessment protocol. Functional independence was evaluated using the Functional Independence Measure (FIM).

2.4 Measurements

2.4.1 Functional Independence Measure

The Functional Independence Measure (FIM) was used to assess functional independence. FIM was developed by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation. This 18-item instrument evaluates six domains of function, with each item scored on a 7-point scale (1 = total assistance, 7 = complete independence). Total scores range from 18 to 126, with higher scores indicating greater independence.

2.4.2 Quality of Life

Quality of life was measured using the validated Arabic Short Form-36 (SF-36) health survey (Guermazi et al., 2012), a comprehensive instrument that assesses eight health domains: Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE), and Mental Health (MH). Scores for each domain range from 0-100, with higher scores indicating better health status. The Arabic SF-36 has shown good reliability, with Cronbach's α ranging from 0.71 to 0.88, and demonstrates strong construct validity.

2.5 Statistics

Data analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY), encompassing descriptive statistics (means, standard deviations, and frequencies), between-group comparisons utilizing t-tests, correlation analysis using Pearson's correlation coefficient, and effect size calculations using Cohen's d . Statistical significance was set at $p < 0.05$, and 95% confidence intervals were calculated for all primary outcomes.

3. Results

Table 3 summarizes the result of the SF-36 questionnaire, used to assess the QOL (quality of life). Based on statistical analysis, all eight SF-36 aspects showed significantly higher scores in the trained group than in the untrained group ($p < .05$ for all comparisons). The trained group ($M = 93.77$, $SD = 2.76$) demonstrated significantly higher total SF-36 scores compared to the untrained group ($M = 42.24$, $SD = 15.53$).

Table 3. Comparison of Quality-of-Life Measures Between Trained and Untrained Groups

	Group	N	M	SD	P
PF	Trained	15	93,33	4,88	0,000
	Untrained	15	50,67	18,21	
BF	Trained	15	100,00	0,00	0,02
	Untrained	15	66,67	48,80	
BP	Trained	15	91,83	10,79	0,000
	Untrained	15	39,67	29,70	
GH	Trained	15	96,94	4,58	0,000
	Untrained	15	32,51	11,27	
VT	Trained	15	86,33	5,16	0,000
	Untrained	15	24,00	8,49	
CP	Trained	15	93,69	3,04	0,000
	Untrained	15	42,70	14,25	
SF	Trained	15	95,00	7,91	0,000
	Untrained	15	30,83	14,07	
RE	Trained	15	97,78	8,61	0,03

	Untrained	15	66,67	48,80	
MH	Trained	15	88,93	5,70	0,000
	Untrained	15	26,93	9,13	
CM	Trained	15	93,90	4,57	0,000
	Untrained	15	41,48	19,60	
TOTAL	Trained	15	93,77	2,76	0,000
	Untrained	15	42,24	15,53	

3.1 Correlation Analyses

Pearson correlation analyses were conducted to examine relationships between different components of quality of life and functional independence. A strong positive correlation was observed between the Cognitive Performance and Mental Health components of the SF-36 ($r^* = .959$, $p^* < .001$, 95% CI [.914, .981]). Additionally, the SF-36 total score showed a strong positive correlation with the Functional Independence Measure (FIM) score ($r^* = .840$, $p^* < .001$, 95% CI [.691, .920]).

Table 4. Correlation between the SF-36 and FIM

		CP	CM
CP	r	1	,959**
	p		,000
CM	r	,959**	1
	p	,000	

Table 5. Correlation between the SF-36 et MIF

		FIM	SF-36
FIM	r	1	,840**
	p		,000
SF-36	r	,840**	1
	p	,000	

4. Discussion

This study investigated the impact of sports participation on the quality of life of paraplegic individuals in Tunisia, revealing substantial differences between trained and untrained participants. Our findings demonstrate significantly higher scores across all SF-36 dimensions in the trained group ($M = 93.77$, $SD = 2.76$) compared to the untrained group ($M = 42.24$, $SD = 15.53$), suggesting comprehensive improvements in overall quality of life for paraplegic individuals who engage in regular sports activities. These results align with and extend the findings of Obradović et al. (2021), who reported increased well-being and life satisfaction among individuals with impairments participating in adaptive sports.

The strong correlation between cognitive performance and mental health components ($r = 0.959$, $p < 0.001$) warrants particular attention, as it suggests complex underlying mechanisms through which sports participation enhances both cognitive function and psychological well-being. This finding is consistent with the meta-analysis by Isidoro-Cabañas (2023), which demonstrated improvements in both mental and physical quality of life for disabled individuals participating in adapted sports. The cognitive benefits likely stem from several physiological mechanisms, including enhanced cerebral blood flow, increased neurotrophic factor production (particularly BDNF), and strengthened neural networks associated with executive function and memory processing.

The psychological benefits observed in the trained group appear to operate through multiple pathways. At a neurobiological level, physical activity modulates neurotransmitter systems, particularly serotonin and dopamine, which regulate mood and emotional well-being. The achievement-oriented nature of sports provides opportunities for mastery experiences, enhancing self-efficacy and internal locus of control, which may explain the superior mental health scores in the trained group.

The robust association between SF-36 and FIM scores ($r = 0.840$, $p < 0.001$) indicates that improved quality of life correlates with greater functional independence, supporting the findings of Neto and Lopes (2015) regarding improvements in body composition and functional capacity. This relationship suggests that enhanced cognitive and mental health may translate into improved functional independence through increased motivation, better problem-solving abilities, and greater emotional resilience when facing daily challenges.

Our findings strongly support the social benefits of sports participation highlighted by Chen (2024) and Slavković et al. (2021). The significantly higher scores in social functioning for the trained group suggest that group-based physical activities create valuable opportunities for social learning, peer support, and development of communication skills. These social interactions may stimulate cognitive function through complex interpersonal dynamics while simultaneously building psychological resources through shared experiences and community belonging.

Study limitations include its cross-sectional design, which prevents establishment of causal relationships, and the relatively small sample size ($n=30$), which may limit result generalizability. Additionally, potential selection bias in sports participation cannot be ruled out. Future research should employ longitudinal designs to establish causality, investigate specific sports modalities' differential effects, and examine dose-response relationships between participation intensity and observed benefits.

These findings contribute to a growing body of evidence supporting the integration of adaptive sports in rehabilitation protocols. Understanding the mechanisms through which sports participation enhances cognitive function, mental health, and functional independence can inform the development of more effective, evidence-based interventions. Future program development should consider both the physiological and psychological pathways identified in this study to maximize potential benefits for participants.

In conclusion, our findings strongly support the positive impact of sports participation on the quality of life of paraplegic individuals in Tunisia. The comprehensive nature of improvements across all SF-36 dimensions suggests that sports participation initiates a positive feedback loop: enhanced physical capabilities lead to improved mental health, which in turn motivates continued participation and greater functional independence. These results underscore the importance of promoting and facilitating access to adaptive sports programs as part of comprehensive rehabilitation strategies. Future research should focus on identifying specific sports interventions that yield the most significant benefits and exploring potential barriers to sports participation among paraplegic individuals in various cultural contexts.

5. Conclusion

This study demonstrates a significant positive impact of sports participation on the quality of life of paraplegic individuals in Tunisia. Trained participants showed substantially higher scores across all SF-36 dimensions compared to untrained participants, indicating comprehensive improvements in physical, mental, and social well-being. Strong correlations between cognitive performance, mental health, and functional independence underscore the multifaceted benefits of sports engagement. While acknowledging our study's limitations in design and sample size, our findings nonetheless contribute valuable insights to the field and have important implications for rehabilitation practices and public health policies.

6. Recommendations

Based on these findings, we recommend the systematic integration of adaptive sports programs into rehabilitation protocols for individuals with paraplegia in Tunisia. This integration should encompass both institutional support through healthcare facilities and community-based initiatives to enhance accessibility. Healthcare providers should receive specialized training in adaptive sports implementation, focusing on evidence-based practices that maximize physical and psychological benefits. Additionally, future research efforts should prioritize longitudinal studies to establish clear causal relationships between specific sports activities and quality of life outcomes in this population.

Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest.

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Data Availability Statement

The data that support the findings of this study are available on request.

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