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Attitudes and Perceptions Towards Physical Activity in Italian People with Spinal Cord Injury: A Cross-Sectional Observational Study

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Abstract: Physical activity (PA) is a crucial tool for managing comorbidities and preventing secondary complications in individuals with spinal cord injuries (SCIs). Despite its well-documented benefits, participation in PA among individuals with SCI remains low, with significant barriers affecting engagement. The aim of this study was to assess the attitudes of Italian individuals with SCI towards PA and to identify the factors that influence these attitudes. A cross-sectional observational study was conducted using an ad hoc questionnaire to assess five domains of attitudes towards PA: physical benefits, psychological benefits, motivation, social aspects, and perceived barriers. Demographic characteristics were analyzed using descriptive statistics. Spearman's correlation was used to examine associations between domains. Group differences based on activity levels were assessed using the Mann–Whitney U test. A total of 54 participants (mean age 51.0 ± 13.89 years) completed the questionnaire. Among them, 49 acknowledged the physical benefits of physical activity for health, while 44 recognized its psychological benefits. However, 17 participants (31.5%) reported barriers related to accessibility, cost, and lack of adapted programs. Individuals with SCI demonstrate a predominantly positive attitude towards PA, but significant barriers limit their participation. Previous sports participation showed a promising contribution in shaping attitudes towards PA, particularly in the psychological, motivational, and social domains.

Keywords: physical exercise; motivational factors; barriers; facilitators

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1. Introduction

Spinal cord injury (SCI) is a severe and irreversible neurological event, with significant and long-lasting consequences on the quality of life of the affected individual, as well as that of their family members and caregivers [1]. In Europe, between 2011 and 2020, 1303 patients with incident traumatic SCI were identified in a population of 4.9 million inhabitants [2], while in Italy, a multicenter study reported an annual incidence of 14.7 cases per million, with a higher prevalence among males (male-to-female ratio of 4:1) and a mean age of 54 years [3]. The most frequent causes were falls (40.9%) and road traffic accidents (33.5%) [3].

Depending on the neurological level (typically cervical, thoracic, or lumbar) and completeness of injury, individuals with SCI may experience impairments in motor, sensory, and autonomic functions that significantly reduce their capacity for movement and physical activity (PA) [4]. Cervical injuries may result in greater motor impairment (tetraplegia), while thoracic and lumbar injuries more commonly lead to paraplegia. These impairments create personal, logistical, and societal barriers to PA, including dependence on assistance, inaccessible exercise facilities, and lack of tailored exercise programs [5].

Furthermore, secondary complications of SCI, such as cardiovascular dysfunctions, neurogenic bladder, bowel management, metabolic syndrome, osteoporosis, pressure ulcers, spasticity, chronic pain, and muscle mass loss, significantly limit functional capacity and complicate participation in regular PA [6]. Indeed, individuals with SCI experience reduced energy and metabolic capacity during exercise, making regular PA even more crucial to counteract these limitations and maintain overall health [7]. Indeed, PA is particularly recognized as a primary tool for preventing secondary complications and managing comorbidities in individuals with SCI [8].

People with disabilities should have full access to opportunities for improving their health and well-being, as affirmed by the United Nation Convention on the Rights of Persons with Disabilities. Despite this, individuals with disabilities, including those with SCI, often encounter substantial barriers to PA, such as inaccessible environments, lack of information, and ableist social attitudes [9].

According to World Health Organization (WHO) guidelines [10], PA is considered regular for individuals with disabilities when it includes at least 150 min per week of moderate-intensity aerobic exercise or at least 75 min per week of vigorous-intensity exercise. Adequate PA levels are associated with numerous health benefits, including a reduced risk of cardiovascular diseases [11], type 2 diabetes [12], obesity [13], and certain types of cancer [14]. Conversely, prolonged SB and physical inactivity are recognized as independent risk factors for the development of chronic conditions and increased mortality [15].

However, research shows that only 12–29% of individuals with SCI meet these guidelines [16,17], and they are up to 15 times more likely to lead sedentary lifestyles compared to the general population [8] and compared to those with other chronic conditions [18], even after adjusting for known correlates such as age, sex, body mass index, comorbidities, and socioeconomic status [17].

A growing body of literature has explored barriers and facilitators to PA among individuals with SCI. These include lack of transportation, cost of participation, fear of injury, and low self-confidence [18]. While one study used behavioral models such as social cognitive theory to emphasize the role of self-efficacy, outcome expectations, and self-regulation [19], fewer have examined attitudes explicitly using a structured theoretical framework in country-specific contexts.

In this regard, the theory of planned behavior (TPB) [20–22] offers a valuable framework for understanding PA engagement. The TPB posits that behavioral intention is the main predictor of behavior, and it is influenced by three components: (1) attitudes towards the behavior, (2) subjective norms, and (3) perceived behavioral control [8,20,23]. In individuals with SCI, attitudes towards PA may be shaped by the perception of their physical capabilities and expected benefits of exercise. Based on the TPB framework, this study focuses primarily on the attitudinal component as a modifiable psychological factor associated with PA participation.

The aim of this study was to assess the attitudes of Italian individuals with SCI towards PA. We hypothesize that individuals with SCI would demonstrate predominantly negative attitudes towards PA, which may contribute to their limited participation in PA.

2. Materials and Methods

2.1. Study Design

This cross-sectional observational study used a structured ad hoc questionnaire to collect information on attitudes and perceptions regarding PA among individuals with SCI. The study was conducted in accordance with the principles of the Declaration of Helsinki and received approval from the University of Bologna Bioethics Committee (Protocol N. 0217169).

2.2. Questionnaire

Two questionnaires were administered to the participants: an ad hoc-designed instrument developed for this study and a validated tool, the Leisure Time Physical Activity questionnaire [22].

Participants were recruited through national and regional spinal cord injury (SCI) associations, such as the FAIP (Federazione Associazioni Italiane Paratetraplegici) and the AUS (Associazione Unità Spinale) Montecatone network. The survey link was disseminated via mailing lists, newsletters, and social media platforms managed by these associations (Figure 1). All individuals who accessed the online platform (Microsoft Forms) were presented with an informed consent page. Only participants who accepted the consent and completed all mandatory items of the questionnaire were included in the final sample. Participants were eligible for this study if they were over 18 years of age, residing in Italy, fluent in Italian, had a diagnosed SCI, and were not in the acute phase of SCI (at least six months post-injury). The questionnaire is provided in Appendix A.

Figure 1. Distribution of the sample across different Italian regions.

2.2.1. Ad Hoc Questionnaire Design

The structured ad hoc questionnaire was designed to assess attitudes towards PA focusing on various aspects related to motivation, perceived barriers, and the benefits of PA, as well as the demographic information and anamnesis elements of the participants. The questionnaire was divided into two sections.

The first section of the questionnaire collected demographic data (age, sex, and geographical origin) and anthropometric characteristics (weight and height). Specific data regarding the participants, such as the level of SCI (thoracic, cervical, or lumbar), degree of injury (complete or incomplete), date and cause of injury (traumatic or non-traumatic), and data on information received from healthcare providers regarding PA, were also collected.

The structure of the ad hoc questionnaire was informed by the theory of planned behavior (TPB). The 5 domains of the questionnaire were as follows: (1) physical domain: perceived importance of PA for health and physical well-being (9 items); (2) psychological domain: emotional and psychological benefits associated with PA (7 items); (3) motivational domain: motivation and enjoyment derived from engaging in PA (3 items); (4) sociality domain: social aspects and autonomy related to PA (5 items); and (5) barrier domain: perceived barriers to adopting an active lifestyle (8 items). These domains correspond to key components of the TPB.

Specifically, attitude towards the behavior was assessed through items related to physical and psychological domains. Subjective norms were reflected in the sociality domain, capturing perceived social support and expectations. Perceived behavioral control was addressed through the barrier and motivational domains, evaluating individuals' perceptions of obstacles to engaging in PA.

For each item, the participants indicated their level of agreement with a series of statements (items) using a 5-point Likert scale (where 1 corresponded to "strongly disagree" and 5 to "strongly agree") [24,25].

For each domain, the mean score was calculated by summing the individual responses and dividing them by the number of items included in the domain. The questionnaire was distributed through the Microsoft Forms platform (Microsoft Corporation, Redmond, WA, USA, 2020).

2.2.2. Leisure Time Physical Activity

The "Leisure Time Physical Activity (LTPA) for People with Spinal Cord Injury" questionnaire [26] was used to quantify current levels of PA. This tool was designed to assess the amount of PA performed in the last seven days, distinguishing between light-, moderate-, and vigorous-intensity PA.

To obtain a single composite score, a specific weight was assigned to each type of activity: 0.5, 1, and 2 for light-, moderate-, and vigorous-intensity activity, respectively. The total score for each participant was calculated by summing the scores associated with the frequency and duration of the activities practiced during the week, according to the following formula:

$$Score = (0.5 \times L) + (1 \times M) + (2 \times V) \quad (1)$$

L = minutes of low-intensity activity

M = minutes of moderate-intensity activity

V = minutes of vigorous-intensity activity

By assigning these weights, reaching 150 points corresponds to meeting the WHO guidelines [10]. Thus, participants with a score $\geq$150 were classified as "active" (i.e., meeting or exceeding the WHO recommendations), while those with a score <150 were classified as "inactive".

2.3. Statistical Analysis

Demographic characteristics were summarized using descriptive statistics, expressed as mean and standard deviation (SD) or as frequency and percentage, where appropriate. The frequency distribution of the responses to the Likert scale questions was presented to summarize the participants' answers. The Shapiro–Wilk test was used to assess the assumption of normality. Spearman's correlation coefficient and its 95% confidence interval (CI) via a bootstrap procedure [27] were applied to measure linear relationships between the domains. Furthermore, beyond reporting *p*-values, we calculated the value of effect size (ES) by using Cohen's d. ES values of 0.2, 0.5, and 0.8 were considered to be small, moderate, and large differences, respectively [28].

The Mann–Whitney U test was used to compare the median scores between the two groups defined by LTPA ($\leq$150 = inactive, >150 = active), with an effect size based on rank-biserial correlation. Statistical analyses were performed using IBM SPSS Statistics version 25.0 (SPSS Inc., Chicago, IL, USA) for Windows. Results were considered statistically significant at $p < 0.05$.

3. Results

3.1. Sample Characteristics

A total of 54 people (51.0 $\pm$ 13.89 years) with SCI answered the questionnaires and were included in the analysis. Table 1 presents the sociodemographic and anthropometric characteristics of the sample.

Table 1. Sociodemographic and anthropometric characteristics of the sample.

Questions	Answers	Total
		n° (%)
Gender	Female	17 (31.5)
	Male	37 (68.5)
BMI	Underweight	7 (12.9)
	Normal weight	31 (57.4)
	Overweight	11 (20.3)
	Obesity class I	4 (7.4)
	Obesity class III	1 (1.8)
Marital status	Cohabiting	7 (13.0)
	Single	20 (37.0)
	Married	24 (44.4)
	Widowed	1 (1.9)
	Divorced	2 (3.7)
Educational level	Middle school	11 (20.4)
	High school	22 (40.7)
	Bachelor's degree	21 (38.9)
Occupation	Unemployed	7 (13.0)
	Part-time job	6 (11.1)
	Full-time job	11 (20.4)
	Retired	26 (48.1)
	Student	4 (7.4)
Housing condition	Living with partner	18 (33.3)
	Living with family	29 (53.7)
	Living alone	6 (11.1)
	Living in an assisted facility	1 (1.9)

Table 1. *Cont.*

Questions	Answers	Total
Annual income	Less than EUR 10,000	8 (14.8)
	EUR 10,000–20,000	18 (33.3)
	EUR 20,000–30,000	16 (29.6)
	EUR 30,000–40,000	6 (11.1)
	EUR 40,000–50,000	3 (5.6)
	More than EUR 50,000	3 (5.6)
Pre-injury sport level	Competitive	8 (14.8)
	Recreational regular	16 (29.6)
	Recreational irregular	16 (29.6)
	None	14 (25.9)

Responses were collected from various regions of Italy: Emilia-Romagna (24.1%) was the most represented region, followed by Friuli-Venezia Giulia (22.2%) and Apulia (16.7%). Other participants were from Piedmont, Sicily, Abruzzo, Veneto, Trentino-Alto Adige/Sudtirol, Campania, Tuscany, and Sardinia (Figure 1).

Based on the anamnesis data, the level of SCI varied among participants. A total of 42.6% (n° = 23) reported a thoracic level injury, 38.9% (n° = 21) had a cervical level injury, while the remaining participants had lumbar injuries (n° = 10) (Figure 2).

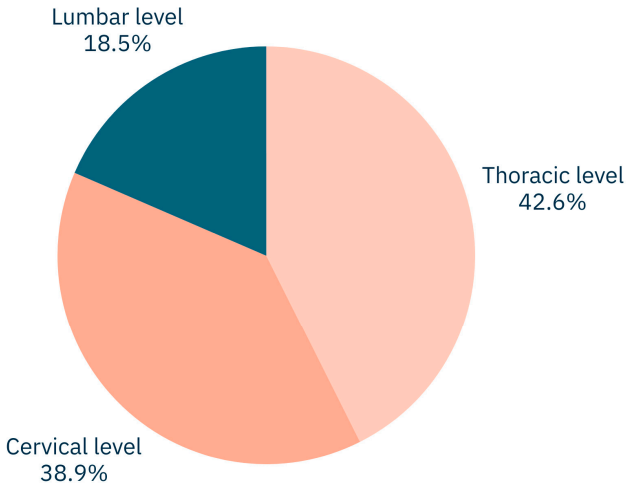

Figure 2. Distribution of SCI levels in the sample.

About 59.3% (n° = 32) of participants had a complete SCI, while 40.7% (n° = 22) reported an incomplete injury. The injuries were predominantly traumatic in nature, accounting for 87.0% of the cases, while only 13.0% of the participants had non-traumatic injuries.

Information Received on Physical Activity from Healthcare Providers

To explore whether individuals with SCI received advice regarding the importance of PA, participants were asked to report on their most recent interactions with the healthcare system and whether PA had been recommended during these encounters. Regarding communication with the healthcare system, 25.9% of participants reported that their last contact occurred over six months ago. More recent interactions were reported by 44.4% of participants: 22.2% had contact between one week and one month ago, and another 22.2% within the last week. Additional responses included 11.1% with contact 2–3 months ago, 9.3% within 1–2 months, and 9.3% between 3 and 6 months ago. As for information about PA, 37.0% of participants received advice from a physiotherapist, 27.8% from a physiatrist, and 24.1% received no information at all. Only a small proportion reported receiving

advice from a general practitioner (5.6%) or an occupational therapist (5.6%). In terms of the communication method, 69.8% of participants received the information orally, 7.5% in written form, while 22.6% reported not having received any information.

3.2. Attitude and Perception Towards PA

The high proportion of "agree" or "strongly agree" responses indicates that the perceived tangible advantages and the willingness to regularly practice exercise are widely recognized. From a psychological perspective, most respondents believed that PA had a positive impact on their psychological well-being. However, there is a significant minority who do not share this view or express a clear stance (responses of disagreement or neutrality). With regard to social aspects, the responses revealed a more heterogeneous picture: while many participants acknowledged their importance, the presence of neutral or disagreeing answers suggests that the relational component is not universally regarded as a key factor in exercise adherence. Finally, the analysis of barriers reveals that, while some individuals perceive no substantial obstacles, a considerable portion remain uncertain (neutral responses) or report actual difficulties in accessing PA. Overall, the participants exhibited a predominantly positive attitude towards PA, especially concerning physical benefits and the motivation to engage in it. The results of the questionnaire are shown in Table 2.

Table 2. Results of the questionnaire by domain.

Domains	Answers				
	1—Totally Disagree	2—Disagree	3—Neither Agree nor Disagree	4—Agree	5—Totally Agree
	n° (%)	n° (%)	n° (%)	n° (%)	n° (%)
Physical domain	0 (0.0)	1 (1.9)	4 (7.4)	29 (53.7)	20 (37)
Psychological domain	0 (0.0)	5 (9.3)	5 (9.3)	36 (66.7)	8 (14.8)
Motivational domain	0 (0.0)	0 (0.0)	12 (22.2)	30 (55.6)	12 (22.2)
Sociality domain	0 (0.0)	5 (9.3)	13 (24.1)	33 (61.1)	3 (5.6)
Barrier domain	0 (0.0)	17 (31.5)	19 (35.2)	18 (33.3)	0 (0.0)

The correlation analysis (Table 3) of the physical, psychological, motivational, and sociality domains showed positive and significant correlations between them. Psychological and motivational attitudes correlate with high level of significance ($p < 0.001$) most strongly ($\rho = 0.775$), followed by motivational–sociality ($\rho = 0.697$), physical–motivational ($\rho = 0.691$), and physical–psychological ($\rho = 0.674$). In each case, the confidence interval sits well above zero, reflecting large effect sizes and tight estimates of the true association. Two further links showed medium-strength associations: motivational with barrier ($\rho = 0.320$) and physical with sociality ($\rho = 0.495$). Their intervals also exclude zero but are wider, signaling more moderate consistency. By contrast, none of the correlations between the barrier domain and physical ($\rho = 0.195$), psychological ($\rho = 0.144$), or sociality ($\rho = 0.255$) attitudes reached significance.

Table 3. Correlation coefficients (ρ) between domains.

Domains	ρ	*p*-Value	ES	CI
Motivational vs. barrier	0.320	0.018	Medium	[0.071–0.541]
Motivational vs. sociality	0.697	<0.001	Large	[0.486–0.85]
Physical vs. barrier	0.195	0.157	Small	[−0.073–0.438]
Physical vs. motivational	0.691	<0.001	Large	[0.509–0.817]
Physical vs. psychological	0.674	<0.001	Large	[0.449–0.808]
Physical vs. sociality	0.495	<0.001	Medium	[0.241–0.691]
Psychological vs. barrier	0.144	0.297	Small	[−0.143–0.413]
Psychological vs. motivational	0.775	<0.001	Large	[0.599–0.884]
Psychological vs. sociality	0.692	<0.001	Large	[0.459–0.842]
Sociality vs. barrier	0.255	0.063	Small	[−0.032–0.523]

Note: CI represents the confidence interval of ρ, and ES denotes the effect size.

3.3. Correlation Between LTPA and Domains

To verify whether LTPA was associated with different domains of exercise-related attitudes, a correlation analysis was conducted between the LTPA score and the scores of the five domains considered (physical, psychological, motivational, sociality, and barrier). As shown in Table 4, people who were more active reported stronger beliefs in the physical benefits of exercise (ρ = 0.375, 95% CI [0.097, 0.603], $p = 0.005$). Secondly, higher activity levels were also tied to greater motivation to exercise (ρ = 0.413, 95% CI [0.139, 0.629], $p = 0.002$). By contrast, we found no significant connections between LTPA and the psychological, sociality, and barrier domains.

Table 4. Correlation coefficients (ρ) between LTPA and domain scores.

	Physical Domain	Psychological Domain	Motivational Domain	Sociality Domain	Barrier Domain
ρ	0.375	0.21	0.413	0.245	0.234
p-value	0.005 *	0.128	0.002 *	0.074	0.089
Effect size	Medium	Small	Medium	Small	Small
CI Lower	0.097	−0.069	0.139	−0.042	−0.042
CI Upper	0.603	0.487	0.629	0.498	0.502

Note: The asterisk symbol (*) is utilized to highlight correlation coefficients with $p < 0.05$.

3.4. Comparison of Active vs. Non-Active Subgroups

To examine the correlation between LTPA and domain scores, we performed a subgroup analysis comparing participants classified as active ($n = 27$) versus inactive ($n = 27$), based on whether they met the recommended levels of PA, across each of the five domains. As shown in Figure 3 and Table 5, the only statistically significant difference emerged in the motivational domain ($p = 0.04$), with a rank-biserial correlation of 0.29, indicating a moderate effect size. Differences in the other domains did not reach statistical significance (barrier domain: $p = 0.053$; physical domain: $p = 0.114$; psychological domain: $p = 0.447$; sociality domain: $p = 0.238$).

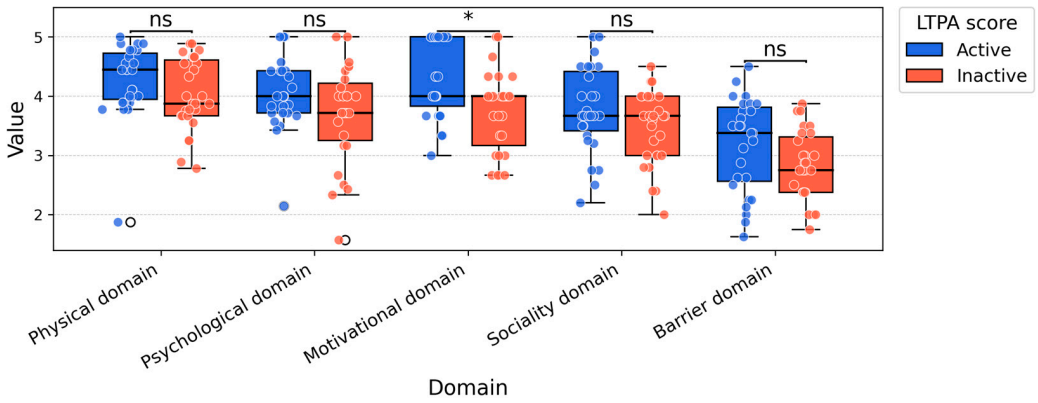

Figure 3. Comparison of active vs. non-active subgroups. Note: ns: not significant * $p < 0.05$.

Table 5. Statistics results of the Mann–Whitney U test between active and inactive people with an effect size based on rank-biserial correlation.

	Physical Domain	Psychological Domain	Motivational Domain	Sociality Domain	Barrier Domain
***p*-value**	0.114	0.447	0.04 *	0.238	0.053
Effect size	0.259	0.125	0.293	0.192	0.316

Note: The asterisk symbol (*) is utilized to highlight correlation coefficients with $p < 0.05$.

4. Discussion

This cross-sectional observational survey explored the attitude of individuals with SCI towards PA.

4.1. Attitude and Perception Towards PA

The main result of this survey was that people with SCI exhibited an overall positive attitude towards PA. This suggests that the importance attributed to PA for health and physical well-being was widely recognized by the participants, indicating strong agreement with the benefits that PA can bring. To the best of our knowledge, this is the first study investigating attitude towards PA with use of the TPB [21,22] in people with SCI. However, many studies recognize the impressive impact of a positive attitude to engaging in PA [29]. Knowledge of the benefits of PA may serve as an incentive for participants to engage in PA, as suggested by Cavill et al. [30], who highlighted that greater awareness of the beneficial effects of exercise is associated with higher participation in PA programs. Furthermore, Rhodes et al. [31] reported that the perception of personal efficacy and knowledge of the benefits of PA are key factors in promoting the adoption of physically active behaviors, especially among populations with chronic conditions or disabilities. The high perception of psychological benefits among participants suggests that individuals with SCI are not only aware of the role of PA in maintaining physical health but also recognize its value in supporting mental well-being. This is particularly promising for people with SCI, since it is aligned with previous research highlighting how PA can reduce symptoms of depression and anxiety, enhance mood, and foster a sense of purpose in individuals with SCI [29,32]. Responses related to the social dimension of PA revealed greater variability compared to other domains. Many participants acknowledged the importance of social interaction [33], but such variability suggests that relational aspects are not universally perceived as key motivators. This heterogeneity may reflect individual differences in personality, social support networks, and preferences for solitary versus group-based activities. Moreover, individuals who have limited access to peer communities or who experience social isolation due to environmental or attitudinal barriers may be less inclined to view social engagement

as a motivating factor. Conversely, those embedded in supportive environments may find social interaction to be a critical enabler of sustained activity [34]. In light of this, programs that foster a sense of community or peer support may help those who find social engagement motivating but may be less relevant for others who prefer more independent forms of exercise. Moreover, social support and encouragement from friends, family, and healthcare professionals emerged as key factors in maintaining a positive attitude towards PA. Recent studies have shown that social support can mitigate the impact of perceived barriers, facilitating the transition to a more active lifestyle and increasing participation in exercise programs [8,34]. Conversely, a lack of support can exacerbate feelings of isolation and further reduce motivation to engage in regular PA [35]. This underscores the importance of creating inclusive and accessible PA programs that encourage the participation of individuals with SCI by providing them with a supportive environment. For instance, the lack of adequate infrastructure, adapted exercise programs, and specialized personnel represents a significant challenge for individuals with disabilities [36]. Finally, the results of the barrier domain showed a balanced distribution of responses among participants. These results emphasize the complexity of translating positive attitudes towards PA into regular participation. While participants recognized the benefits of exercise, logistical, economic, and social barriers can hinder their ability to engage. Filipcic et al. [34] highlighted that those who recognize the benefits of PA are more likely to integrate it into their lifestyle, despite physical and environmental barriers. On the other hand, perceived barriers, such as limited accessibility to sport facilities and using inadequate equipment or a lack of social support can negatively influence attitudes and discourage participation [8]. However, perceived barriers are not limited to the physical aspects. Psychological factors, such as a lack of self-efficacy or the perception of being unable to exercise safely, can also negatively influence attitudes towards PA [34]. Targeted strategies are essential to overcoming these obstacles, including improving accessibility, training qualified professionals, and providing financial support. Such interventions could facilitate greater adherence to PA and promote physical, psychological, and social well-being, particularly for individuals with specific needs, such as those with SCI.

4.2. Correlation Between Domains

The correlation analysis revealed strong and significant associations among the physical, psychological, motivational, and sociality domains, suggesting that these dimensions of attitudes towards PA are interconnected. These findings align with theoretical models such as the TPB [21], which emphasizes the interplay between perceived benefits, internal motivation, and social influence in shaping behavioral intentions. In theory, these correlations may suggest that reinforcing one domain, such as enhancing psychological understanding or motivational support, may positively influence attitudes towards PA and, consequently, PA participation. Notably, the barrier domain did not significantly correlate with the physical, psychological, or sociality domains. This dissociation may imply that perceived barriers operate independently of general attitudes towards PA benefits and could reflect more external, structural, and environmental challenges (e.g., access, cost, and transportation), rather than internal beliefs or values [37].

4.3. Sample Characteristics

The descriptive analysis of the sample revealed considerable variability in communication between participants and healthcare professionals regarding PA. Despite the well-documented benefits of PA for people with SCI, many participants reported receiving insufficient information on the topic. This communication gap may contribute to lower participation in exercise programs, thereby hindering the potential physical and psycho-

logical health benefits for these individuals. The importance of active involvement by healthcare professionals in promoting PA is well recognized, especially among individuals with disabilities or vulnerabilities. Indeed, people are more likely to adhere to recommendations offering clear and actionable guidance to promote PA given by healthcare professionals, such as doctors, physiotherapists, and other practitioners [38–40]. This is also valid for people with physical disabilities [41,42]. Providing tailored advice, such as adapted programs or access to suitable facilities, can facilitate engagement. To improve participation, strategies should not only inform patients about the benefits of PA but also actively engage them in structured and accessible programs [43,44]. This could include written materials, personalized consultations, and easier access to resources helping to bridge existing gaps in communication between doctors and patients. In the Italian context, regional disparities also play a role: northern regions typically offer more structured PA promotion within healthcare systems, while southern regions may face barriers related to infrastructure, service availability, and health literacy [45,46].

4.4. Domains and Physical Activity Levels

The present study showed a moderate positive correlation between LTPA levels, the perception of physical benefits of exercise, and personal motivation. Moreover, the subgroup analysis comparing active and inactive participants revealed a statistically significant difference exclusively in the motivational domain. This confirms that individuals who are more physically active tend to place greater value on the physical effects of exercise and exhibit higher levels of intrinsic motivation [34]. These findings align with previous research emphasizing the central role of motivation as a determinant of PA behavior in individuals with SCI [5]. Recent evidence also supports this interpretation. A meta-analysis by Sur et al., (2022) [21] confirmed the central role of perceived physical outcomes and motivation in sustaining PA engagement in adults with physical disabilities. Similarly, Collado et al., (2021) [47] emphasized that enhancing intrinsic motivation and the perceived utility of exercise can significantly influence adherence in populations with mobility limitations. These results highlight that enhancing motivation, potentially through tailored interventions, may be a key strategy for increasing PA participation in this population. At the same time, strategies that address contextual and structural barriers remain essential to support the transition from intention to behavior.

4.5. Limitations of the Study

This study presents some limitations. Firstly, the sample size is relatively small (54 participants) and includes individuals from various age groups, predominantly male, with different mobility, which may further limit the generalizability of the results. To address the reduced statistical power inherent in a limited sample, effect sizes for all associations were calculated and reported, providing an estimate of effect magnitude independent of p-values. Secondly, the use of an ad hoc questionnaire that, although developed by experts and informed by the existing literature, was not subjected to formal psychometric validation may limit the reliability of the results. Moreover, participants were recruited from various regions of Italy, but the geographical distribution is uneven, with some regions overrepresented and others underrepresented. This could affect the results related to the variability of PA based on geographical location as well as cultural and socio-economic differences. In addition, the geographical distribution of the sample, which came mainly from Northern Italy (59.4%), could influence the perception of structural barriers to accessing services that are strictly linked to the areas of origin. Finally, the high percentage of people who were physically active (as measured by the LTPA questionnaire) may reflect a bias in favor of positive attitudes towards PA.

5. Conclusions

Italian people with SCI generally show positive attitudes towards PA, recognizing its physical, psychological, and social benefits. However, significant barriers, primarily related to accessibility, persist. Among the variables examined, previous sports participation and living with family emerged as key factors associated with more favorable attitudes. These findings highlight the importance of considering experiential and environmental influences when designing strategies to support and encourage PA in this population.

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Abbreviations

The following abbreviations are used in this manuscript:

PA	Physical activity
SCI	Spinal cord injury
MET	Metabolic equivalent of task
SB	Sedentary behavior
WHO	World Health Organization
BMI	Body mass index
LTPA	Leisure Time Physical Activity
IQR	Interquartile range
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences
TPB	Theory of planned behavior

Appendix A. Questionnaire of Attitudes and Perceptions Towards Physical Activity

Appendix A.1. Demographic and Anamnestic Data

1. Age _____
2. Gender

□ Male
□ Female
□ Other

□ Prefer not to say

3. Weight (kg)_____
4. Height (cm)_____
5. City of residence_____
6. Level of spinal cord injury_____
7. Degree of spinal cord injury

□ Complete
□ Incomplete

8. Date of injury_____
9. Cause of the injury

□ Traumatic
□ Vascular
□ Infectious/inflammatory
□ Neoplastic
□ Degenerative

10. Current level of mobility

□ Fully independent
□ Partially independent (with aids)
□ Not independent

11. Use of mobility aids

□ None
□ Wheelchair
□ Walker
□ Crunches

12. Other relevant health conditions

□ None
□ Chronic pain
□ Cardiovascular diseases
□ Respiratory diseases
□ Digestive diseases
□ Urinary diseases
□ Congenital anatomical alterations
□ Other

13. Marital status

□ Single
□ Married
□ Living with a partner
□ Divorced
□ Widowed

14. Education level

□ Primary school
□ Middle school
□ High school diploma
□ Bachelor degree
□ Ph.D.

15. Employment status

□ Student
□ Full-time employment
□ Part-time employment
□ Unemployed
□ Retired

16. Living situation

□ I live alone
□ I live with family
□ I live with my partner
□ I live in a care facility

17. Annual income

□ Less than €10,000
□ €10,000–€20,000
□ €20,000–€30,000
□ €30,000–€40,000
□ €40,000–€50,000
□ More than €50,000

18. Previous level of sport participation

□ None
□ Recreational/irregular
□ Moderate/regular
□ High/competitive

Appendix A.2. Information Received on Physical Activity from Healthcare Providers

19. How long has it been since your last contact with the healthcare system?

□ Less than 1 week
□ 1 week–1 month
□ 1–2 months
□ 2–3 months
□ 3–6 months
□ More than 6 months

20. Have you received information about the importance of physical activity?

□ From no one
□ From a physiatrist
□ From a physiotherapist
□ From a general practitioner
□ From an exercise specialist (kinesiologist)
□ From an occupational therapist
□ From a nurse

21. How was the information provided?

□ No information provided
□ Orally
□ In written form

Table A1. Questions on a 5-point Likert scale. Items are grouped into five domains: health, emotional benefits, motivation, social aspects, and barriers. Some items were reverse-coded.

Questions	Answers				
	Totally Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Totally Agree**
Importance of physical activity for health and physical well-being					
Physical activity is important for my fitness	1	2	3	4	5
Physical activity is important for my health	1	2	3	4	5
Physical activity is important for my lifestyle	1	2	3	4	5
Physical activity is not necessary	5	4	3	2	1
Physical activity is not for me	5	4	3	2	1
Physical activity is important for upper limb functionality	1	2	3	4	5
Physical activity helps me improve my general health status	1	2	3	4	5
I do not have time for physical activity	5	4	3	2	1
I experience pain when engaging in physical activity	5	4	3	2	1
Emotional and psychological benefits of physical activity					
Physical activity helps me manage stress	1	2	3	4	5
Physical activity makes me feel more energetic	1	2	3	4	5
I am confident in my ability to perform physical exercises	1	2	3	4	5
Physical activity allows me to feel less tired	1	2	3	4	5
Physical activity helps me sleep better	1	2	3	4	5
Thanks to physical activity, I can accept my body	1	2	3	4	5
I feel embarrassed when engaging in physical activity	5	4	3	2	1
Motivation and enjoyment in physical activity					
I enjoy being physically active	1	2	3	4	5
I do not feel able to engage in physical activity	5	4	3	2	1
I do not feel motivated to engage in physical activity	5	4	3	2	1
Social aspects and autonomy related to physical activity					
Physical activity helps me not feel lonely	1	2	3	4	5
Physical activity makes me feel more independent	1	2	3	4	5
Physical activity is a way to socialize	1	2	3	4	5
I can independently manage my physical exercise program	1	2	3	4	5
I can adapt physical activities to my needs	1	2	3	4	5
Barriers related to physical activity					
Physical activity facilities are accessible to me	1	2	3	4	5
There are adequate spaces for practicing physical activity	1	2	3	4	5
I have access to specialized trainers who help me	1	2	3	4	5
There are specific physical activity programs for people with spinal cord injuries in my area	1	2	3	4	5
The equipment for physical activity meets my needs	1	2	3	4	5
My friends and family approve of my being physically active	1	2	3	4	5
I participate in groups or communities that support physical activity	1	2	3	4	5
The cost of structured physical activity is too high	5	4	3	2	1

References

1. Kennedy, P.; Chessell, Z.J. Traumatic versus Non-Traumatic Spinal Cord Injuries: Are There Differential Rehabilitation Outcomes? *Spinal Cord* **2013**, *51*, 579–583. [CrossRef] [PubMed]
2. Barbiellini Amidei, C.; Salmaso, L.; Bellio, S.; Saia, M. Epidemiology of Traumatic Spinal Cord Injury: A Large Population-Based Study. *Spinal Cord* **2022**, *60*, 812–819. [CrossRef]
3. Ferro, S.; Bonavita, J.; Pagliacci, M.C.; Biggeri, A.; Franceschini, M. Incidence of Traumatic Spinal Cord Injury in Italy during 2013–2014: A Population-Based Study. *Spinal Cord* **2017**, *55*, 1103–1107. [CrossRef] [PubMed]
4. Tweedy, S.M.; Beckman, E.M.; Geraghty, T.J.; Theisen, D.; Perret, C.; Harvey, L.A.; Vanlandewijck, Y.C. Exercise and Sports Science Australia (ESSA) Position Statement on Exercise and Spinal Cord Injury. *J. Sci. Med. Sport* **2017**, *20*, 108–115. [CrossRef]
5. Martin Ginis, K.A.; Ma, J.K.; Latimer-Cheung, A.E.; Rimmer, J.H. A Systematic Review of Review Articles Addressing Factors Related to Physical Activity Participation among Children and Adults with Physical Disabilities. *Health Psychol. Rev.* **2016**, *10*, 478–494. [CrossRef] [PubMed]
6. Sezer, N. Chronic Complications of Spinal Cord Injury. *World J. Orthop.* **2015**, *6*, 24. [CrossRef]
7. Price, M. Energy Expenditure and Metabolism during Exercise in Persons with a Spinal Cord Injury. *Sports Med.* **2010**, *40*, 681–696. [CrossRef]
8. Baehr, L.A.; Kaimal, G.; Hiremath, S.V.; Trost, Z.; Finley, M. Staying Active after Rehab: Physical Activity Perspectives with a Spinal Cord Injury beyond Functional Gains. *PLoS ONE* **2022**, *17*, e0265807. [CrossRef]
9. Ives, B.; Clayton, B.; Brittain, I.; Mackintosh, C. 'I'Ll Always Find a Perfectly Justified Reason for Not Doing It': Challenges for Disability Sport and Physical Activity in the United Kingdom. *Sport Soc.* **2021**, *24*, 588–606. [CrossRef]
10. Bull, F.C.; Al-Ansari, S.S.; Biddle, S.; Borodulin, K.; Buman, M.P.; Cardon, G.; Carty, C.; Chaput, J.-P.; Chastin, S.; Chou, R.; et al. World Health Organization 2020 Guidelines on Physical Activity and Sedentary Behaviour. *Br. J. Sports Med.* **2020**, *54*, 1451–1462. [CrossRef]
11. Groah, S.L.; Lichy, A.M.; Libin, A.V.; Ljungberg, I. Intensive Electrical Stimulation Attenuates Femoral Bone Loss in Acute Spinal Cord Injury. *PM&R* **2010**, *2*, 1080–1087. [CrossRef]
12. Lai, Y.-J.; Lin, C.-L.; Chang, Y.-J.; Lin, M.-C.; Lee, S.-T.; Sung, F.-C.; Lee, W.-Y.; Kao, C.-H. Spinal Cord Injury Increases the Risk of Type 2 Diabetes: A Population-Based Cohort Study. *Spine J.* **2014**, *14*, 1957–1964. [CrossRef] [PubMed]
13. Fogelholm, M. Physical Activity, Fitness and Fatness: Relations to Mortality, Morbidity and Disease Risk Factors. A Systematic Review. *Obes. Rev.* **2010**, *11*, 202–221. [CrossRef] [PubMed]
14. Li, T.; Wei, S.; Shi, Y.; Pang, S.; Qin, Q.; Yin, J.; Deng, Y.; Chen, Q.; Wei, S.; Nie, S.; et al. The Dose–Response Effect of Physical Activity on Cancer Mortality: Findings from 71 Prospective Cohort Studies. *Br. J. Sports Med.* **2016**, *50*, 339–345. [CrossRef]
15. Goyal, J.; Rakhra, G. Sedentarism and Chronic Health Problems. *Korean J. Fam. Med.* **2024**, *45*, 239–257. [CrossRef]
16. Jetha, A.; Faulkner, G.; Gorczynski, P.; Arbour-Nicitopoulos, K.; Martin Ginis, K.A. Physical Activity and Individuals with Spinal Cord Injury: Accuracy and Quality of Information on the Internet. *Disabil. Health J.* **2011**, *4*, 112–120. [CrossRef]
17. Soriano, J.E.; Squair, J.W.; Cragg, J.J.; Thompson, J.; Sanguinetti, R.; Vaseghi, B.; Emery, C.A.; Grant, C.; Charbonneau, R.; Larkin-Kaiser, K.A.; et al. A National Survey of Physical Activity after Spinal Cord Injury. *Sci. Rep.* **2022**, *12*, 4405. [CrossRef]
18. Vermaak, C.; Ferreira, S.; Terblanche, E.; Derman, W. Physical Activity Promotion in Persons with Spinal Cord Injuries: Barriers and Facilitators in Low-Resource Communities. *Afr. J. Disabil.* **2022**, *11*, 8. [CrossRef]
19. Martin Ginis, K.A.; Latimer, A.E.; Arbour-Nicitopoulos, K.P.; Bassett, R.L.; Wolfe, D.L.; Hanna, S.E. Determinants of Physical Activity Among People with Spinal Cord Injury: A Test of Social Cognitive Theory. *Ann. Behav. Med.* **2011**, *42*, 127–133. [CrossRef]
20. Kan, M.P.H.; Fabrigar, L.R. Theory of Planned Behavior. In *Encyclopedia of Personality and Individual Differences*; Zeigler-Hill, V., Shackelford, T.K., Eds.; Springer International Publishing: Cham, Switzerland, 2017; pp. 1–8. ISBN 978-3-319-28099-8.
21. Sur, M.H.; Jung, J.; Shapiro, D.R. Theory of Planned Behavior to Promote Physical Activity of Adults with Physical Disabilities: Meta-Analytic Structural Equation Modeling. *Disabil. Health J.* **2022**, *15*, 101199. [CrossRef] [PubMed]
22. Ajzen, I. The Theory of Planned Behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
23. Etheridge, J.C.; Sinyard, R.D.; Brindle, M.E. Implementation Research. In *Translational Surgery*; Elsevier: Amsterdam, The Netherlands, 2023; pp. 563–573, ISBN 978-0-323-90300-4.
24. Likert, R. A Technique for the Measurement of Attitudes. In *Archives of Psychology*; Palala Press: Boulder, CL, USA, 1932.
25. Liu, M.; Lee, S.; Conrad, F.G. Comparing Extreme Response Styles between Agree-Disagree and Item-Specific Scales. *Public Opin. Q.* **2015**, *79*, 952–975. [CrossRef]
26. Martin Ginis, K.A.; Phang, S.H.; Latimer, A.E.; Arbour-Nicitopoulos, K.P. Reliability and Validity Tests of the Leisure Time Physical Activity Questionnaire for People With Spinal Cord Injury. *Arch. Phys. Med. Rehabil.* **2012**, *93*, 677–682. [CrossRef]
27. Fritz, C.O.; Morris, P.E.; Richler, J.J. Effect Size Estimates: Current Use, Calculations, and Interpretation. *J. Exp. Psychol. Gen.* **2012**, *141*, 2–18. [CrossRef]
28. Cohen, J. A Power Primer. *Psychol. Bull.* **1992**, *112*, 155–159. [CrossRef]

29. Papathomas, A.; Williams, T.L.; Smith, B. Understanding Physical Activity Participation in Spinal Cord Injured Populations: Three Narrative Types for Consideration. *Int. J. Qual. Stud. Health Well-Being* **2015**, *10*, 27295. [CrossRef]
30. Cavill, N.; Kahlmeier, S.; Racioppi, F. *Physical Activity and Health in Europe: Evidence for Action*; WHO: Geneva, Switzerland, 2006. [CrossRef]
31. Rhodes, R.E.; Kaushal, N.; Quinlan, A. Is Physical Activity a Part of Who I Am? A Review and Meta-Analysis of Identity, Schema and Physical Activity. *Health Psychol. Rev.* **2016**, *10*, 204–225. [CrossRef]
32. Martin Ginis, K.A.; Jetha, A.; Mack, D.E.; Hetz, S. Physical Activity and Subjective Well-Being among People with Spinal Cord Injury: A Meta-Analysis. *Spinal Cord* **2010**, *48*, 65–72. [CrossRef]
33. Levins, S.M.; Redenbach, D.M.; Dyck, I. Individual and Societal Influences on Participation in Physical Activity Following Spinal Cord Injury: A Qualitative Study. *Phys. Ther.* **2004**, *84*, 496–509. [CrossRef]
34. Filipcic, T.; Sember, V.; Pajek, M.; Jerman, J. Quality of Life and Physical Activity of Persons with Spinal Cord Injury. *Int. J. Environ. Res. Public Health* **2021**, *18*, 9148. [CrossRef]
35. Pels, F.; Kleinert, J. Loneliness and Physical Activity: A Systematic Review. *Int. Rev. Sport Exerc. Psychol.* **2016**, *9*, 231–260. [CrossRef]
36. Rezende, L.S.; Lima, M.B.; Salvador, E.P. Interventions for Promoting Physical Activity Among Individuals With Spinal Cord Injury: A Systematic Review. *J. Phys. Act. Health* **2018**, *15*, 954–959. [CrossRef] [PubMed]
37. Rimmer, J.H.; Riley, B.; Wang, E.; Rauworth, A. Accessibility of Health Clubs for People with Mobility Disabilities and Visual Impairments. *Am. J. Public Health* **2005**, *95*, 2022–2028. [CrossRef]
38. Haider, S.; Grabovac, I.; Smith, L.; Stefanac, S.; Jackson, S.E.; Li, Y.; Cao, C.; Waldhoer, T.; Zhang, Y.; Dorner, T.E.; et al. Health Care Providers' Advice on Lifestyle Modification for Older Adults. *J. Am. Med. Dir. Assoc.* **2020**, *21*, 361–366.e1. [CrossRef]
39. Sanchez, A.; Bully, P.; Martinez, C.; Grandes, G. Effectiveness of Physical Activity Promotion Interventions in Primary Care: A Review of Reviews. *Prev. Med.* **2015**, *76*, S56–S67. [CrossRef] [PubMed]
40. Kunstler, B.E.; Cook, J.L.; Freene, N.; Finch, C.F.; Kemp, J.L.; O'Halloran, P.D.; Gaida, J.E. Physiotherapist-Led Physical Activity Interventions Are Efficacious at Increasing Physical Activity Levels: A Systematic Review and Meta-Analysis. *Clin. J. Sport Med.* **2018**, *28*, 304–315. [CrossRef]
41. Giouridis, N.; Williams, T.L.; Tomasone, J.R. Physical Activity Promotion to Persons with Spinal Cord Injury by Health and Exercise Professionals: A Scoping Review. *J. Spinal Cord Med.* **2023**, *46*, 126–145. [CrossRef] [PubMed]
42. Lobelo, F.; De Quevedo, I.G. The Evidence in Support of Physicians and Health Care Providers as Physical Activity Role Models. *Am. J. Lifestyle Med.* **2016**, *10*, 36–52. [CrossRef]
43. Williams, T.L.; Smith, B.; Papathomas, A. The Barriers, Benefits and Facilitators of Leisure Time Physical Activity among People with Spinal Cord Injury: A Meta-Synthesis of Qualitative Findings. *Health Psychol. Rev.* **2014**, *8*, 404–425. [CrossRef]
44. Roberton, T.; Bucks, R.S.; Skinner, T.C.; Allison, G.T.; Dunlop, S.A. Barriers to Physical Activity in Individuals with Spinal Cord Injury: A Western Australian Study. *Aust. J. Rehabil. Couns.* **2011**, *17*, 74–88. [CrossRef]
45. Istituto Nazionale di Statistica (ISTAT). *Well-Being and Inequalities in Italy*; Istituto Nazionale di Statistica (ISTAT): Rome, Italy, 2024.
46. Federico, B.; Roscillo, G.; Falese, L.; Soto, V.; Perelman, J.; Richter, M.; Rimpelä, A.; Kunst, A.; Lorant, V. Socioeconomic Inequalities in Physical Activity in Adolescents of Six European Cities. *Eur. J. Public Health* **2014**, *24*, cku162-057. [CrossRef]
47. Collado-Mateo, D.; Lavín-Pérez, A.M.; Peñacoba, C.; Del Coso, J.; Leyton-Román, M.; Luque-Casado, A.; Gasque, P.; Fernández-del-Olmo, M.Á.; Amado-Alonso, D. Key Factors Associated with Adherence to Physical Exercise in Patients with Chronic Diseases and Older Adults: An Umbrella Review. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2023. [CrossRef] [PubMed]