



Original Research

Perceived Barriers to Leisure-Time Physical Activity Among Physically Active Individuals With Spinal Cord Injury



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KEYWORDS

exercise;
rehabilitation;
barrier;
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Abstract Objective: To investigate barriers to leisure-time physical activity (LTPA) for physically active people with spinal cord injury (SCI).

Design: Prospective cross-sectional.

Setting: General community.

Participants: One hundred and five physically active individuals with SCI.

Interventions: Semi-structured interviews and surveys.

Main Outcome Measure: Participants were surveyed and interviewed to determine barriers and determinants of LTPA participation. SCI-specific physical activity (PA) guideline adherence was documented. Barriers were categorized using the capability, opportunity, motivation, and behavior model, and regression statistics were used to determine relationships between LTPA volume and barriers.

Results: Health problems, costs of equipment and programs, pain, and a lack of energy were the most common capability barriers, and a lack of accessible facilities, confidence in the knowledge and skill of a health professional, and a lack of time were common opportunity barriers.

List of abbreviations: ANOVA, analysis of variance; BCT, behavior change technique; B-PADS, Barriers to Physical Activity and Disability Survey; COM-B, capability, opportunity, motivation and behavior; LTPA, leisure-time physical activity; LTPAQ-SCI, Leisure Time Physical Activity Questionnaire for People with Spinal Cord Injury; PA, physical activity; SCI, spinal cord injury; WHO, World Health Organization.

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Motivation barriers pertained to self-consciousness in a fitness center and a lack of interest. Believing LTPA to be too difficult, uninteresting, and unable to improve health emerged as significant barriers to SCI-specific PA guideline adherence.

Conclusion: SCI-specific PA guideline adherence was below 50% in physically active individuals. There are still numerous capability and opportunity barriers that physically active people with SCI must overcome when engaging in LTPA. Motivational barriers such as feeling self-conscious in a fitness center significantly influence PA guideline compliance in this population. Service providers should emphasize the benefit of LTPA to people with SCI while providing LTPA options that facilitate enjoyment, interest, and inclusivity, particularly for those who do not meet PA guideline recommendations.

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More than half of all Australians are physically inactive or do not meet the recommended guidelines for physical activity (PA) established by the World Health Organization (WHO).¹ The disease burden of physical inactivity and obesity equates to that of tobacco smoking and has become one of Australia's leading factors for morbidity.² For adults diagnosed with a physical disability in Australia, 72% fail to meet the PA levels recommended.^{3,4} Data analysis from the recent Australian arm of the International Spinal Cord Injury Community Survey (n=1579) revealed that only 13% of people living with spinal cord injury (SCI) met minimum PA guideline recommendations and that 42% of the large sample was physically inactive.⁵ This is not an isolated trend, as cross-sectional research done in Canada, Germany, and Thailand reported that between 19% and 50% of their national SCI populations are entirely sedentary.⁶⁻⁸ SCI-specific guidelines suggest that people undertake at least 2 sessions of 20 minutes of aerobic PA (at a moderate-to-vigorous intensity) and 3 sessions of strength exercises (for major muscle groups) twice weekly to improve cardiorespiratory fitness. However, greater volumes of weekly PA have been recommended to elicit more significant cardiometabolic benefits.⁹

Additionally, it may be that incidental PA associated with daily living is not intense enough to alter the health of people with SCI significantly.¹⁰ Leisure-time physical activity (LTPA) is a component of PA and is activity people choose to do in their free time, such as sports, exercise, or going for a walk/wheel.¹¹ Research suggests that these structured activities should be undertaken if those with SCI want to reduce the likelihood of secondary complications and enhance their physical capacity.¹⁰

Barriers to PA uptake for the SCI population are reasonably understood¹²⁻¹⁶ and are usually related to personal, environmental, or resource factors.¹²⁻¹⁴ However, barriers particular to physically active individuals with SCI have received less attention in research. Kehn and Kroll's qualitative analysis in 2009¹⁷ revealed that active individuals with SCI faced significant restrictions in their PA because of the absence of personal assistance with exercise and a lack of accessible facilities and exercise options. In 2017, Rauch et al.¹⁸ conducted a study aiming to elucidate factors influencing PA and the attainment of the WHO's recommendations on PA.¹ The investigators underscored the importance of social support and self-efficacy as critical elements to consider in initiatives designed to encourage or sustain PA among people with SCI.

A nuanced investigation of the barriers faced by individuals who have overcome the initiation of LTPA may reveal valuable insights to facilitate greater overall LTPA volumes in the SCI population. A study in 2011 examined barriers to PA for people with SCI in Western Australia,¹⁹ but a national systematic analysis of barriers to PA for this population has yet to be undertaken. Further research in this area may help discern why, even though almost 58% of people with SCI in Australia are physically active, only 13% of those people⁵ met PA guideline recommendations. Additionally, the National Disability Insurance Scheme²⁰ was introduced in Australia in 2016 and is considered the global criterion standard for affirming choice, autonomy and independence among individuals with disabilities through national disability support programs.²¹ This scheme aims to mitigate impediments to leisure activities such as LTPA for people with disabilities. Despite this, LTPA volume and adherence in the SCI population remain inadequate and attention is warranted considering the myriad of lifestyle diseases associated with SCI.²²

In a scoping review by Lawrason et al.,¹⁶ investigators examined PA correlates among individuals with SCI who ambulated using the capability, opportunity, motivation and behavior (COM-B) model.²³ This model is a robust behavior framework frequently used to examine the determinants of human behavior.^{24,25} The COM-B model allows researchers to identify which behavior change techniques (BCTs) to incorporate into interventions that address facilitators or barriers.²³ This is particularly useful considering the recent publication of a systematic review of interventions that have used BCTs to improve PA behavior in the SCI population.²⁶ By mapping barriers against the COM-B model, researchers can develop authentic context-specific interventions and policies to improve LTPA²⁵ in this sedentary population.

Thus, the primary purpose of this study was to examine LTPA barriers faced by a physically active Australian cohort with SCI and categorize these according to the COM-B model. Additionally, we sought to explore if a person's LTPA history and specific aspects of their social life might influence LTPA volume. These attributes have been previously unexplored and included (1) whether pre-injury PA guideline adherence made it more likely that an individual would meet SCI-specific PA guideline recommendations post-injury; (2) whether participants who had a physically active spouse were more likely to engage in LTPA themselves; and

(3) if the method (ie, supervised or self-directed) of conducting LTPA was related to higher volumes of LTPA.

Methods

Statement of ethics

This study was approved by the University of Sydney Human Research Ethics Committee (HREC 2022/351).

Recruitment and design

This prospective cross-sectional study recruited participants (n=105) from across Australia. The survey commenced in September 2022 and concluded in July 2023.

The online surveys were distributed on the Research Electronic Data Capture (REDCap) software (<https://www.project-redcap.org/>). The researchers engaged a diverse range of consumer organizations through email and telephone communications to inform them about the study and seek permission to send flyers and informational sheets for display throughout their facilities and for circulation among their members. The authors identified these organizations via a thorough search of the internet and an extensive database of support and services for SCI in Australia. These organizations included outpatient rehabilitation services, care and support worker providers, and not-for-profit SCI advocacy organizations. These organizations informed their clientele of the survey by publishing advertisements on social media, hanging advertisements throughout their facilities, and printing advertisements for participants to take home. The advertisements from consumer and support organizations contained general information on the study, directions to a Participant Information Statement, and a quick response code and hyperlink that participants could use to access the survey. Consent for the study was obtained after the participant had accessed the survey online in the REDCap system but before the participant could complete any survey questions. Alternatively, participants could email or call investigators for access to the online survey or request that a hard copy be sent via postal mail. Participants in this study were not obligated to complete the survey and were reimbursed for their time with an electronic gift card.

Participants independently completed the barriers to LTPA and demographic surveys online. Subsequently, semi-structured interviews were conducted via telephone or online video call to collect and code LTPA data. Two study investigators conducted the interviews. One interviewer was an accredited exercise physiologist; the other was an Australian Health Practitioner Regulation Agency-registered physiotherapist. Both had extensive experience working with people with SCI and delivering survey questionnaires. Participants were instructed to reflect on their LTPA when answering the barriers survey.

Participants

To be included, participants had to be at least 18 years of age, residing within Australia, have a diagnosed SCI that

resulted from a traumatic injury or a nontraumatic disorder, and be at least 12 months post-injury. The study investigators verified each participant's demographic and injury inclusion criteria using data collected from the demographic questionnaire before proceeding to the interview.

Participants were required to have engaged in LTPA in the 7 days before completing the survey and interview. A minimum threshold of 15 minutes of total LTPA was used for inclusion in the analysis, consistent with a precedent set by a large-scale study (n>57,000) examining LTPA in individuals with SCI.²⁷ Participants were reminded of the requirement for recent LTPA engagement on logging into the REDCap online survey via a notification that required acknowledgment. The interviewers also reiterated this before the interview began. Participants who had poor cognitive function, an unstable health condition that required intensive therapeutic attention, were physically inactive in the last 7 days, or had undergone surgery in the previous 30 days were excluded.

Data collection

Data regarding sociodemographic details and injury-related characteristics were collected via a study-specific online questionnaire based on previous population-level research.²⁸

The Leisure Time Physical Activity Questionnaire for People with Spinal Cord Injury (LTPAQ-SCI)²⁹ was used during the interviews to assess the volume and intensity of LTPA participation. This recall questionnaire assessed mild, moderate, and vigorous-intensity LTPA and strength-training LTPA undertaken over the previous 7 days. The LTPAQ-SCI is reliable and valid in measuring LTPA participation among people with SCI.³⁰

The Barriers to Physical Activity and Disability Survey (B-PADS)³¹ was used to assess barriers to participation in this study. The B-PADS was developed to identify specific barriers that people with disabilities face in undertaking PA and is a reliable outcome tool for people with different disabilities.³¹⁻³³ The B-PADS contains 38 questions categorized as perceptions, capabilities, and perceived external barriers. The original B-PADS was designed to encompass people with diverse disabilities and was not specific to individuals with SCI.³¹ However, a modified version of the B-PADS for people with SCI has been previously used in Thailand,⁸ the United States,¹⁰ Australia,¹⁹ and Malaysia.³⁴ The B-PADS in this study was modified for people with SCI to align with recommendations from previous research^{8,10,19,34} and included an open-ended question that allowed participants to list a barrier not represented in the B-PADS.

Spousal and preinjury LTPA data were gathered during the interview. The interviewer asked the participants to recall their immediate preinjury LTPA routine and their spouse's current LTPA routine. The study investigators used the WHO PA guidelines¹ to determine if the participants met PA recommendations preinjury based on their responses in the interview.

Statistical analyses

All statistical analyses were conducted using SPSS version 28 (IBM SPSS, Inc^a). Data are presented as mean (SD) in grouped data.

Barriers to LTPA were examined across all participants, including both guideline-adherents and non-adherents, with descriptive and summary statistics calculated for each category. *t* tests were conducted between the positive scores for each B-PADS item between guideline-adherents and non-adherents, and odds ratios were computed between these subgroups to determine the likelihood of a person being a non-adherer if the barrier was present.

Each barrier item in the B-PADS was categorized using the COM-B model.²³ This involved scrutinizing each barrier using the COM-B constructs. *Capabilities* are divided into physical and psychological components and are attributes of a person that allow a behavior to be possible. *Opportunity* refers to accessibility to inanimate parts of the environment or through organizations and people to enable behavior. *Motivation* involves thought processes that drives the individual to engage in the behavior and can be automatic, affective processes, or reflective.²³ The categorization process was adapted from methods by Lawrason et al¹⁶ in their scoping review of factors influencing PA among people with SCI who ambulate, and a practical guide designed by Michie et al²³ was used to ensure accuracy in the process.

The relationship between preinjury PA guideline adherence and current SCI-specific PA guideline adherence was examined using a chi-square test. The relationship between LTPA volume and (1) having a partner who undertakes weekly LTPA and (2) the method of conducting LTPA (ie, supervised or self-directed) was examined using a point-biserial correlation and a one-way analysis of variance (ANOVA), respectively. The Bonferroni test for multiple comparisons was applied in the ANOVA to prevent erroneous findings arising out of a type 1 error.

Results

Cohort characteristics

Three individuals who completed the survey did not meet the LTPA inclusion criteria in this study and were subsequently excluded. This determination was made during the interview. One hundred and five physically active people with SCI in Australia were included. Males comprised 63% (n=66) of participants; the mean age of all participants was 50 (15) years, and the mean time since injury was 13 (14) years. Sociodemographic characteristics have been reported in [table 1](#).

Barriers to LTPA

Over 40% of participants had experienced health problems that caused them to stop exercising, only 35% believed that an experienced exercise trainer would have the appropriate knowledge to assist them with an exercise program, and 32% reported cost and access to facilities as barriers. Additionally, just 39% of participants had received advice from a physician regarding the importance of participating in LTPA. Despite this, 91% of participants thought an exercise program could help them. Approximately 30% of participants listed pain as a barrier to LTPA participation, and results indicated that participants were over 4 times more likely to

Table 1 Sociodemographic and injury characteristics of participants

	Mean (SD)
Age at the time of survey (y)	56.1 (14.9)
Time since injury (y)	13.2 (13.6)
	n (%)
Sex	
Male	66 (62.9)
Female	39 (37.1)
Relationship status	
Single	50 (47.6)
Partnership	54 (47.6)
Missing	1 (1.0)
Household income	
Below-average household income	64 (61.0)
Above-average household income	29 (27.6)
Missing	12 (11.4)
Highest educational level	
Primary to secondary	25 (23.8)
Post-secondary or tertiary	30 (28.6)
Bachelor or masters	44 (41.9)
PhD	6 (5.7)
Injury level	
Paraplegia	51 (58.1)
Tetraplegia	44 (41.9)
Missing	0 (0)
Completeness	
Complete	20 (28.6)
Incomplete	73 (69.5)
Missing	12 (11.4)
Cause of injury	
Traumatic	81 (77.1)
Nontraumatic	22 (21.0)
Missing	12 (11.4)
Employed	
No	37 (35.2)
Yes	43 (41.0)
Missing	25 (23.8)
Ambulation less than 100m	
Manual wheelchair	35 (33.3)
Electric wheelchair/scooter	13 (12.4)
Walking device(s)	15 (14.3)
No assistive device(s)	8 (7.6)
Missing	34 (32.4)
Ambulation of more than 100 m	
Manual wheelchair	33 (31.4)
Electric wheelchair/scooter	27 (25.7)
Walking device(s)	7 (6.7)
No assistive device(s)	4 (3.8)
Missing	34 (32.4)

achieve SCI-specific PA guideline recommendations if they were aware of an accessible exercise facility (OR [95% CI] =4.29 [1.28-14.36], *P*=.021).

The belief that LTPA could not improve their condition and the feeling that LTPA was uninteresting and too difficult were significant barriers for people who did not adhere to PA guidelines compared to those who did. Additionally, feeling self-conscious in a fitness center and not knowing a facility

they could use was associated with whether a person would achieve volumes of LTPA to satisfy guidelines. Forty per cent of nonadherents reported feeling self-conscious in a fitness center, and this was associated with performing a lower volume of LTPA (OR [95% CI]=.20 [0.07-0.61], $P=.032$). The results of the barrier analysis are presented in [table 2](#) for all participants, PA guideline-adherents and non-adherents, and [figure 1](#) presents barriers categorized using the COM-B model for all participants.

LTPA behavior and PA guideline adherence

Forty-seven per cent of participants in this study met SCI-specific PA guideline recommendations.⁹ The chi-square test revealed that individuals who achieved PA guideline levels¹ pre-injury were not more likely to achieve SCI-specific PA guidelines after their injury ($X^2 [2, N=105]=1.92, P=.382$). A breakdown of LTPA intensity volumes and PA guideline adherence has been listed in [table 3](#).

Of the 54 individuals who reported being in a relationship, 37 (35%) reported that their partner was also physically active. However, there was no significant relationship between total LTPA volume and being in a relationship with a physically active person ($P=.367$) when compared to being in a relationship with a physically inactive person.

Twenty-nine participants (28%) undertook supervised exercise as part of a community gym or sports program. Thirty-one (30%) participants self-directed their LTPA, and 45 (42%) participants undertook both self-directed and supervised LTPA. One-way ANOVA revealed a significant difference in total LTPA ($F[2, 101]=3.29, P=.043$) and MV-LTPA ($F[2, 101]=3.70, P=.029$) between the ways participants undertook their LTPA. Analyses indicated that the total LTPA mean for supervised activity (mean=188±139 min/wk) was significantly lower than the combined self-directed and supervised activity value (mean=396±236 min/wk).

Discussion

This study investigated barriers to LTPA experienced by physically active Australians with SCI. Capability and Opportunity barriers, particularly cost and accessibility to LTPA facilities, prevented active individuals from engaging in as much LTPA as they would like. Additionally, Motivational barriers such as self-consciousness in a fitness center and a perceived lack of return on physical investment limited LTPA volume and influenced PA guideline compliance.

Less than half of the sample in this study met PA recommendations for the SCI population,⁹ and pre-injury LTPA volume did not influence current LTPA volume. A study investigating the relationship between pre-injury and post-injury PA guideline adherence in people with mild traumatic brain injury³⁵ reported that post-injury guideline adherence was significantly lower than pre-injury adherence. However, caution is warranted when comparing these 2 populations due to by their different clinical presentations, cognitive and behavioral factors, and condition-specific PA guideline recommendations. Future studies could use regression modeling to determine the association between pre-injury

and post-injury PA participation to examine further the influence of pre-injury PA behavior on post-injury PA volume.

The finding that participants reported more LTPA when their weekly volume was supervised and self-directed was unsurprising. Prior research has noted that home programs are a valuable tool to improve the volume of LTPA achieved in this sedentary population.³⁶ The effectiveness of home programs in improving health, quality of life, and function has been established through the COVID-19 pandemic,³⁶ and exciting uses of technology to facilitate independent LTPA are emerging.³⁷ Our findings support the rationale that supervised LTPA should be supplemented with self-directed activities to aid in achieving recommended volumes and maximize health outcomes.

Participants reported that cost, pain, health concerns, lack of energy, confidence, motivation, interest, and time were prevalent barriers to LTPA. It appears that barriers for active individuals (in performing more significant volumes of LTPA) do not differ significantly from those reported by inactive individuals,¹²⁻¹⁴ which was surprising. A study on individuals with SCI in Australia in 2011¹⁹ highlighted incontinence concerns, cost, and self-consciousness as barriers to LTPA in people with SCI. Besides incontinence concerns, a survey conducted in the United States¹⁴ aligned with a significant portion of our findings. This similarity showed that people who reported engaging in LTPA but did not meet PA guideline recommendations cited self-consciousness as their primary barrier to LTPA. A recent secondary analysis¹³ of results from a randomized controlled trial, which used a PA counseling intervention to influence PA levels,³⁸ found that as routine PA barrier counseling progressed, reported barriers shifted from intrapersonal and interpersonal to institutional and community-related barriers. The study's investigators hypothesized that this shift was caused by increased confidence in being active, leading participants to seek more PA opportunities. This is particularly relevant to our findings, as 40% of guideline non-adherents (compared to 12% of guideline-adherents) reported feeling uncomfortable or self-conscious in a fitness center. The direction of causation remains unanswered, but self-consciousness appears to affect the volume of LTPA that people with SCI undertake as participants who reported it as a barrier performed significantly less total LTPA. Fostering an inclusive and supportive exercise environment should be a high priority for service providers.

Lack of interest, knowledge of where to engage in LTPA, and information from health care professionals were important barriers to consider for PA guideline adherence in our sample. Knowledge of where and how to physically engage in PA is a common barrier reported in the published literature.^{14,15} We would encourage health care professionals, particularly in the acute rehabilitation stage, to discuss the benefits of LTPA in people with SCI, particularly in improving physical capacity³⁹ and pain.⁴⁰

Pain management in SCI is complex. Neuropathic pain is often resistant to pharmacologic treatment⁴¹ which also carries risks of addiction, side effects, and tolerance. Although not as commonly prescribed as conventional drug therapies, exercise leverages both psychological and physiological mechanisms in pain management.⁴² Psychologically, exercise stimulates endorphin release, a natural pain-relief chemical in the brain.⁴¹ Physiologically, muscle

Table 2 Barriers to leisure-time physical activity categorized using the capability, opportunity, motivation, and behavior model

	All participants (n=105)	Guideline-adherents (n=36)	Guideline non-adherents (n=69)	OR (95% CI) of being a non-adherer if the barrier is present or a resource is unavailable
Capabilities				
Have you had any health problems that caused you to stop exercising?	45 (43)	14 (37)	30 (43)	0.92 (0.39-2.19)
Have you ever been injured from exercising?	51 (49)	21 (59)	31 (45)	1.52 (0.65-3.55)
Has your doctor ever told you to exercise?	41 (39)	15 (42)	26 (38)	1.08 (0.46-2.56)
Has your doctor ever told you not to exercise?	15 (14)	5 (5)	5 (5)	-
Lack of energy	30 (29)	12 (32)	18 (26)	1.55 (0.61-3.94)
I don't know how to exercise	2 (2)	1 (2)	0 (0)	-
Health concerns prevent me from exercising	12 (11)	4 (10)	9 (13)	0.84 (0.21-3.37)
Incontinence issues prevent me from exercising	17 (16)	5 (14)	14 (21)	0.54 (0.17-1.77)
Pain prevents me from exercising	32 (30)	9 (24)	22 (32)	0.77 (0.30-2.01)
I am too old to exercise	0 (0)	0 (0)	0 (0)	-
I am afraid to leave my house	2 (2)	0 (0)	3 (4)	-
Opportunities				
Do you know of a fitness center that you could get to?*	84 (80)	32 (90)	48 (70)	4.29 (1.28-14.36) [†]
Do you feel that an exercise instructor at a fitness center would know how to set up an exercise program to meet your needs?	37 (35)	11 (31)	30 (43)	0.63 (0.26-1.51)
Do family responsibilities prevent you from exercising as much as you would like?	13 (12)	4 (12)	10 (15)	0.71 (0.21-2.46)
Do work commitments prevent you from exercising as much as you would like?	17 (16)	6 (17)	9 (13)	1.58 (0.50-5.04)
Bad weather	22 (21)	9 (24)	12 (17)	1.70 (0.58-4.97)
Lack of transportation	16 (15)	4 (10)	12 (17)	0.57 (0.15-2.11)
Lack of time	33 (31)	10 (27)	22 (32)	0.89 (0.35-2.22)
Lack of support from friends or family	6 (6)	0 (0)	4 (6)	0.52 (0.05-6.01)
Lack of accessible facilities	36 (34)	12 (34)	21 (30)	1.23 (0.50-3.06)
Lack of personal care attendants to help	19 (18)	6 (17)	14 (21)	0.82 (0.29-2.34)
Motivations				
Have you gone to a fitness center and it was not a positive experience?	20 (19)	6 (17)	14 (21)	0.93 (0.30-2.82)
Do you feel that an exercise program could help you?	96 (91)	32 (90)	63 (91)	1.24 (0.26-5.89)
Cost of the exercise program	36 (34)	13 (37)	21 (30)	1.37 (0.56-3.37)
Cost of the exercise equipment	28 (27)	10 (29)	14 (21)	1.40 (0.53-3.40)
Lack of interest*	12 (11)	2 (5)	13 (19)	0.23 (0.05-1.16)
Lack of motivation	26 (25)	8 (22)	14 (21)	1.09 (0.39-3.08)
Exercise is boring or monotonous	12 (11)	3 (7)	12 (17)	0.42 (0.10-1.74)
Exercise will not improve my condition*	5 (5)	0 (0)	3 (5)	-
Exercise will make my condition worse	5 (5)	1 (2)	1 (2)	1.07 (0.07-17.7)
Exercising is too difficult*	6 (6)	0 (0)	4 (6)	-
I feel uncomfortable or self-conscious in a fitness center*	24 (23)	4 (12)	28 (40)	0.20 (0.07-0.61) [†]

NOTE. All values are for the percentage of participants that answered "yes."

Abbreviations: CI, confidence interval; n, number; OR, odds ratio.

* The difference between the guideline-adherent and non-adherent results is statistically different at $P \leq .05$.

† The odds ratio is statistically significant at $P \leq .05$.

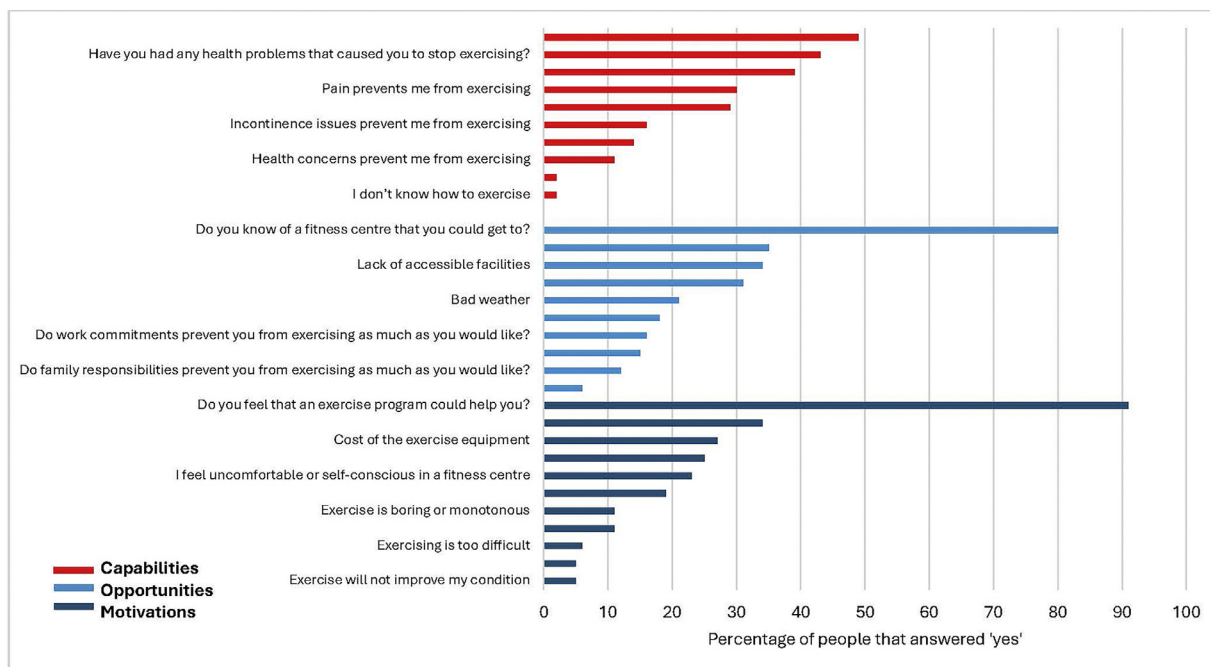


Fig 1 Barriers to leisure-time physical activity categorized according to the capability, opportunity, motivation, and behavior model.

strengthening and flexibility training can improve strength and joint mobility, reducing stress and strain on surrounding tissues.⁴² By understanding the specific pain challenges faced by individuals, health professionals can personalize LTPA regimens to leverage the therapeutic effects of exercise to mitigate pain. Indeed, multidisciplinary programs that included behavioral therapy (especially those which included BCTs such as activity pacing, goal setting, and mentoring) have been shown to improve neuropathic pain.⁴³

Furthermore, it is imperative for allied health professionals to appraise the availability of suitable exercise facilities and programs available for the active SCI population. Scientific literature posits that peer-mentoring mechanisms⁴⁴ and technologies⁴⁵ can effectively facilitate LTPA participation and help educate individuals on the benefits of routine engagement.

Results from our interviews highlight essential areas that service providers can address to improve LTPA by reducing

hindrances to the active SCI population. Indeed, a comprehensive BCT taxonomy⁴⁶ is available to clinicians to assist in applying BCTs to interventions. Integrating such techniques into interventions to improve LTPA behavior may provide valuable ways to overcome at least one type of barrier (capability, opportunity, or motivation) found in this study, which the literature posits is necessary for adequate behavior change.⁴⁷

Study limitations

Our small sample size warrants caution when drawing conclusions based on the findings. A larger sample would be required to present findings representative of the broader Australian SCI population with sufficient statistical power. Investigators attempted factor analysis to explore if a combination of barriers was more influential than individual barriers the LTPA reported, but clusters of less than 7 barriers

Table 3 Descriptive statistics of leisure-time physical activity

LTPA Variable	Mean±SD (min/wk)	Median (min/wk)	Range (min/wk)
Mild LTPA	107±154	70	5-1120
Moderate LTPA	96±130	60	5-720
Vigorous LTPA	26±57	0	10-300
Strength LTPA	96±115	60	10-660
MV-LTPA	123±165	80	5-990
Total LTPA	301±257	210	23-1410
Total PA guideline adherence			
Achieved: n=47 (45%)			
Not achieved: n=58 (55%)			

NOTE. Guideline adherence is benchmarked against fitness SCI-specific PA guidelines.⁹

Abbreviations: LTPA: leisure-time physical activity; min/wk: minutes per week; MV: moderate-to-vigorous; PA: physical activity.

emerged in the analysis. Also, data extraction may have been influenced by the different interview styles of the 2 study investigators who administered the interviews. Occasionally, participants needed prompts to assist with categorizing the intensity at which each LTPA activity was performed. We attempted to mitigate this by strictly adhering to survey instructions and scripts provided by the LTPAQ-SCI authors. We expect any discrepancies in data extraction because of the use of 2 interviewers to be minor.

Finally, our sample was drawn exclusively from Australia. Therefore, we acknowledge that our results and conclusions may not reflect the lived experiences of people from other countries, notably lower socio-economic nations, where barriers and facilitators to LTPA might differ.⁴⁸

Conclusions

The cost of a program and equipment, pain, a lack of accessible and known facilities to physically engage in, a lack of time and energy, and feelings of self-consciousness were the most reported barriers to LTPA for active people with an SCI in Australia. Spousal LTPA behavior and LTPA volume pre-injury did not appear to influence volumes of LTPA performed by physically active people with SCI. Service providers should ensure that LTPA environments feel inclusive and free of judgment, and provide LTPA options that facilitate enjoyment, particularly for active individuals who do not meet PA guidelines. Health professionals should emphasize the benefits of regular LTPA in managing a person's pain, improving their health, and mitigating the chance of developing secondary complications associated with a sedentary lifestyle.

Suppliers

a. SPSS version 28; IBM SPSS, Inc.

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Disclosures

The authors declare that they have no competing interests and that this research has not been previously presented in any form.

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