

ORIGINAL ARTICLE

More than looking good: Impact on quality of life moderates the relationship between functional body image and physical activity in men with SCI

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Study design: Cross-sectional.

Objectives: To examine the relationship between body image and leisure time physical activity (LTPA) among men with spinal cord injury (SCI). Specifically, to examine the moderating function of the perceived impact of body image on quality of life (QOL).

Setting: Ontario, Canada.

Methods: Men with SCI ($N = 50$, 50% paraplegic) reported, (a) their functional and appearance body image (Adult Body Satisfaction Questionnaire), (b) their perceived impact of body image on QOL and (c) LTPA performed over the previous 3 days.

Results: Body image was in the 'normal' range compared with the general population. Linear regression analysis found a significant LTPA \times body image impact on QOL interaction $\beta = 0.39$, $P < 0.05$. Post hoc analysis showed that among individuals who reported a negative effect of body image on QOL, those who engaged in LTPA were less satisfied with their physical function than those who did not. For those who did not perceive their body image to negatively impact their QOL, there was generally no difference in functional body image between those who engaged in LTPA and those who did not.

Conclusion: Appearance body image is not related to LTPA for men with SCI. It has been suggested that body dissatisfaction may motivate some individuals to engage in LTPA. However, for men living with SCI, functional body image may be associated with LTPA only when a negative effect on QOL is perceived. Future research should consider the moderating function of the perceived impact of body image on QOL when examining the relationship between LTPA and body image among men living with SCI.

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Body image is a multidimensional construct that reflects how we see, think, feel and act toward our bodies,¹ and is an important aspect of psychological well-being among people with disability,^{2,3} including those with spinal cord injury (SCI). In fact, there has been a call for research to further explore body image among people with acquired disabilities such as SCI.⁴ Given that body image disturbance is associated with an increased risk for health problems, such as obesity, depression and anxiety,⁵ understanding factors related to body image satisfaction may be an important step toward improving health within the SCI population. Leisure

time physical activity (LTPA; physical activity done during free time) may be one such factor.

Indeed, there is an evidence of an LTPA–body image relationship in studies of disabled and able-bodied populations, with some studies finding a positive relationship⁶ and others finding a negative relationship.⁷ For instance, a meta-analytic review reported that overall greater LTPA participation was associated with a better body image.⁸ However, some individual studies have shown that greater LTPA is associated with worse body image because people use physical activity to manage body image dissatisfaction.⁷ These conflicting findings are reflected in Cash's biopsychosocial model of body image,⁹ which identifies a relationship between the use of self-regulatory behaviors (for example, LTPA and dieting) and body image, and suggests that the variables can moderate the direction of this relationship. The primary purpose of our study was to examine the relation-

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ship between LTPA and body image among men with SCI, and whether the perceived impact of body image on QOL moderates this relationship.

Very little research has examined the LTPA–body image relationship within the SCI population. In one study, people with SCI randomized to an exercise intervention ($n = 11$) reported improved body appearance and functional satisfaction compared with sedentary controls ($n = 12$).⁶ Similarly, men and women with SCI ($n = 12$) reported body satisfaction following a 10-week exercise training program.¹⁰ Furthermore, among 30 people with disability (primarily SCI), those who participated in LTPA reported greater appearance satisfaction compared with those who did not.¹¹ Although preliminary, these findings suggest that LTPA is related to body image among individuals with SCI.

However, a limitation of the extant literature is that body image has been conceptualized primarily as satisfaction with physical appearance and very little attention has been given to satisfaction with physical function. Function and appearance are two independent aspects of body satisfaction.¹² Furthermore, the measure of functional satisfaction may be particularly important when examining body image among men with SCI, because function is affected by SCI as much or more than appearance. Additionally, when considering their own body image, men may place greater importance on the capabilities of their bodies than their appearance.¹³ For these reasons, in this study, body image was conceptualized as satisfaction with physical appearance and satisfaction with physical function.

This study also examined the perceived impact of body image as a moderator of the LTPA–body image relationship. Previous research has found that people vary in terms of the perceived impact of body image on their quality of life (QOL).¹⁴ We hypothesized that men who perceived their body image to have a negative impact on QOL would be more likely to engage in LTPA (that is, to improve their body image) than men who perceived their body image to have no impact or a positive impact on QOL.

Materials and methods

Participants

Participants were 50 men ($M_{\text{age}} = 42$) drawn from the Study of Health and Activity in People with Spinal Cord Injury (SHAPE SCI).¹⁵ Participants had incurred SCI at least 12 months before recruitment, were at least 18 years of age, and relied on an assistive device for mobility (Table 1).

Materials

Body image. The Adult Body Satisfaction Questionnaire¹² measured body image. Participants rated satisfaction with aspects of appearance (for example, weight) and function (for example, arm strength) on a 7-point scale (−3 (very dissatisfied) to +3 (very satisfied)). Appearance and function items were averaged separately to create appearance and functional satisfaction subscale scores. This measure has shown adequate internal consistency for both subscales

Table 1 Participant demographic characteristics

Variable	
<i>Age (years)</i>	
Age at time of testing	42.30 ± 11.23
Age at time of injury	27.00 ± 10.24
Years post injury	15.12 ± 10.11
<i>Lesion level</i>	
Paraplegic	25 (50%)
Tetraplegic	25 (50%)
<i>Completeness of injury</i>	
Complete	20 (40%)
Incomplete	30 (60%)

within the SCI population¹⁶ ($\alpha > 0.70$) and in this study (function $\alpha = 0.83$ and appearance $\alpha = 0.88$).

Body image impact on QOL. Participants were asked to rate ‘how much do your thoughts and feelings about your physical functioning and physical appearance affect your QOL?’ on a 7-point scale (−3 (‘very negative effect’) to +3 (‘very positive effect’)).

Leisure time physical activity. Leisure time physical activity was measured using the valid and reliable Physical Activity Recall Assessment for People with SCI.¹⁷ Participants reported all LTPA performed over the previous 3 days. Average daily LTPA was calculated.

Body composition. Three measures of body composition were assessed as potential covariates. Following previously established protocol,¹⁵ weight was measured using the Health O Meter’s 2450KL (Pelstar LLC, Bridgeview, IL, USA) wheelchair scale, waist circumference was measured at the lowest rib while the participant was in a supine position and body fat percentage was measured using the whole-body bioelectrical impedance analysis (BIA; RJL Systems Bioelectrical Body Composition Analyzer Quantum II, Clinton Twp., MI, USA). Height was measured to calculate body fat percentage, and was measured while the participant was in a supine position on a spinal board.

Methods

Physical Activity Recall Assessment for People with SCI telephone protocol¹⁷ was followed for collecting the LTPA data. Within 14 days of the telephone interview, body composition, body image and demographic data were collected at the home of the participant. Body composition measures were taken in duplicate and averaged. The Adult Body Satisfaction Questionnaire items were read aloud and participants responded verbally, as many were unable to write independently. We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during the course of this research.

Results

Descriptive statistics

Mean functional satisfaction was 0.97 (± 1.15), and mean appearance satisfaction was 0.97 (± 1.68), which corresponds with 'a little satisfied' on the anchored scale. The mean score for the perceived impact on QOL was 0.51 (± 1.65) for functional satisfaction, and 0.53 (± 1.47) for appearance satisfaction, which corresponds to 'a slight positive effect'. Participants engaged in 22.58 (± 35.20) min of LTPA per day. However, 52% of the participants engaged in 0 min of LTPA over the 3-day period and two participants did not complete the Physical Activity Recall Assessment for People with SCI. Given the extreme skewness of the LTPA data, the LTPA variable was dichotomized as 'some LTPA' and 'no LTPA'. Table 2 contains descriptive statistics for the body composition variables. Pearson's correlations and analysis of variance indicated no significant relationships between functional or appearance satisfaction and any of the demographic or body composition variables (Tables 3 and 4). As such, it was not necessary to control for any of these variables in the hypothesis tests.

Table 2 Descriptive statistics for body composition variables

	Mean	s.d.	Range
Weight (kg) ^a	77.72	13.67	50.30–122.30
Waist circumference (cm) ^b	88.17	12.45	53.00–112.70
Body fat (% body mass) ^a	25.39	7.68	4.43–38.67

^an = 50.

^bn = 49.

Table 3 Body image by injury level and completeness

Injury characteristic	Appearance satisfaction		Functional satisfaction	
	Mean	s.d.	Mean	s.d.
<i>Completeness</i>				
Complete	1.3	1.49	1.16	1.07
Incomplete	0.74	1.78	0.85	1.21
<i>Level</i>				
Quadriplegic	0.85	1.52	0.69	1.16
Paraplegic	1.08	1.85	1.26	1.09

Note: no between-group differences.

Table 4 Bivariate correlations between study variables

	FUNC	APP	FUNC QOL	APP QOL	AGE	INJ	YPI	WT	CIRC	BF%
Functional satisfaction (FUNC)	—	0.67**	0.60**	0.46**	0.08	-0.09	0.19	0.22	0.21	0.08
Appearance satisfaction (APP)		—	0.52**	0.55**	0.06	-0.14	0.20	0.08	0.21	0.00
FUNC impact on QOL (FUNC QOL)			—	0.52**	0.08	-0.17	0.27	0.02	-0.01	0.12
APP impact on QOL (APP QOL)				—	0.17	0.03	0.17	0.07	-0.09	0.12
Current age (AGE)					—	0.56**	0.54**	0.27	0.29*	0.07
Age at injury (INJ)						—	-0.39**	0.16	-0.10	-0.15
Years post injury (YPI)							—	0.12	0.13	0.00
Weight (WT)								—	0.94**	0.67**
Waist circumference (CIRC)									—	0.74**
Body fat % (BF %)										—

Note: **P < 0.01.

Hypothesis testing

Separate multiple regression analyses were used to test the hypothesis that impact on QOL will moderate the LTPA–functional satisfaction and LTPA–appearance satisfaction relationships. Impact on QOL was zero centered to control for scale invariance.¹⁸ LTPA (coded as 0 = none and 1 = some) and impact on QOL were entered as main effects on step one of each model. Next, an LTPA \times impact on QOL interaction was entered (that is, LTPA status was multiplied by centered perceived impact on QOL score). This two-step regression analysis satisfies procedures for testing interactions.¹⁸

The model predicting appearance satisfaction was significant (Table 5; $R^2 = 0.34$, $F(3,41) = 8.51$, $P < 0.01$). No main effect was found for LTPA ($\beta = -0.17$, $P = 0.17$) indicating that appearance satisfaction did not differ between men who engaged in LTPA and men who did not. A significant main effect was found for impact on QOL ($\beta = 0.49$, $P < 0.05$), indicating that the greater appearance satisfaction was related to a more positive perceived impact on QOL. There was no LTPA \times impact on QOL interaction effect ($\beta = 0.09$, $P = 0.61$).

The model predicting functional satisfaction was significant (Table 6; $R^2 = 0.42$, $F(3,41) = 11.55$, $P < 0.01$). No main effect was found for LTPA ($\beta = -0.13$, $P = 0.27$), indicating that functional satisfaction did not differ between men who engaged in LTPA and men who did not. A significant main effect for impact on QOL ($\beta = 0.32$, $P < 0.05$) was superseded by a significant LTPA \times impact on QOL interaction ($\beta = 0.39$, $P < 0.05$).

Following standard protocol to evaluate the form of the interaction,¹⁸ separate regression equations were calculated

Table 5 Hierarchical regression predicting appearance satisfaction

	R ² _Δ	R ²	P	β
<i>Step 1</i>				
LTPA	0.38	0.35	<0.01	-0.17
Impact on QOL				0.49**
<i>Step 2</i>				
LTPA	0.004	0.34	<0.001	-0.17
Impact on QOL				0.49**
LTPA \times impact on QOL				0.09

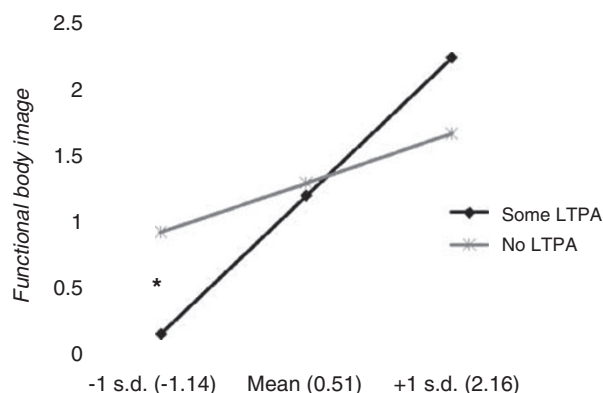
Abbreviations: LTPA, leisure time physical activity; QOL, quality of life.

Note: **P < 0.01.

Table 6 Hierarchical regression predicting functional satisfaction

	R ² _Δ	R ²	P	β
Step 1	0.38	0.35	<0.001	
LTPA				-0.13
Impact on QOL				0.58**
Step 2	0.08	0.42	<0.001	
LTPA				-0.13
Impact on QOL				0.32*
LTPA × impact on QOL				0.39*

Abbreviations: LTPA, leisure time physical activity; QOL, quality of life.

Note: * $P < 0.05$; ** $P < 0.01$.**Figure 1** Plot of the LTPA × impact on QOL interaction effect on functional body image. Note: * Indicates a significantly different functional body image scores between the two groups for those with below average impact on QOL.

for those who did some LTPA versus no LTPA, in which impact on QOL was regressed on functional satisfaction. Predicted levels of functional satisfaction were calculated and plotted (Figure 1) using the mean impact on QOL score, and scores 1 s.d. above and below the mean.

A significant positive relationship was found between the functional satisfaction and impact on QOL for those who did some LTPA ($\beta = 0.75$, $F(1,20)$, $P < 0.05$) and no LTPA ($\beta = 0.42$, $F(1,21)$, $P < 0.01$). Standard procedures¹⁸ were carried out to compare the predicted values with the two groups. Significant differences in functional satisfaction were found between the LTPA groups when impact on QOL was 1 s.d. below the mean ($P < 0.01$), but not when impact on QOL was at the mean ($P = 0.27$) or 1 s.d. above it ($P = 0.35$). In partial support of our hypothesis, these results indicate that men who engaged in LTPA were significantly less satisfied with function than individuals who did not engage in LTPA only when they perceived functional satisfaction to have a negative impact on QOL.

Discussion

This study examined the LTPA–body image relationship among men with SCI and the possible moderating function of the perceived impact of body image on QOL. Men were generally satisfied with their appearance. Given the changes

in physical characteristics that typically follow SCI, the absence of appearance dissatisfaction is incongruent with Cash's body image model.⁹ There are at least two possible reasons why men in this study were not dissatisfied with their appearance. First, appearance satisfaction is a function of the discrepancy between people's actual or perceived body composition and their internalized standards. Following SCI, men may lower appearance standards by shifting value away from physical qualities,¹⁹ or changing the reference group to which they compare their bodies (that is, to other men with SCI) and therefore minimize the discrepancy between one's standards and actual body composition such that the body dissatisfaction does not arise. Second, many other fundamental changes that follow SCI may take precedence over the importance of appearance. Consequently, appearance satisfaction may be of little importance following SCI. Research has demonstrated that people do not necessarily develop body dissatisfaction following disability. For men in particular, appearance may not be of primary importance to their body image. The large proportion of men who perceived appearance satisfaction to have no impact on QOL further highlights the relative unimportance of appearance for many men with SCI.

Considering the functional limitations that follow SCI, it was surprising that men were also generally satisfied with their function. Earlier research has failed to measure functional satisfaction among the SCI population with the exception of one study which reported that participants were little dissatisfied.⁶ However, that study included women who are generally more dissatisfied with their bodies than men. Again, we propose that men may lower their functional standards following SCI, which may protect them from dissatisfaction. Furthermore, our sample averaged 15 years post-injury and may have had time to adjust to functional limitations. Indeed, body image may improve with time following disability.²

Contrary to hypothesis, there was no relationship between LTPA and appearance satisfaction regardless of perceived impact of body image on QOL. These findings refute the notion that poor body image motivates physical activity. However, given that participants were not generally dissatisfied with their appearance, nor did they consider appearance to be particularly important to their QOL, it is understandable that the appearance dissatisfaction did not manifest in greater LTPA.

For functional satisfaction, there was no direct relationship with LTPA but there was a significant interaction with impact on QOL. For individuals who perceived a below average impact on QOL, those who engaged in LTPA were less satisfied with their physical function than those who did not. However, for individuals with an average or above average impact on QOL, there was no difference in functional satisfaction between active and inactive participants. Therefore, our hypothesis was partially supported and supports the research suggesting that the body dissatisfaction can motivate individuals to engage in LTPA, but only among men who are dissatisfied and perceive a negative impact of their body image on QOL.

Of course, one limitation of this study is the cross-sectional design. Prospective research should be conducted

within the framework of Cash's model⁹ to determine the direction of the relation between body dissatisfaction and LTPA. A second limitation is the use of a single item measure of impact on QOL, which may not have fully captured the construct. This item was developed to broadly capture the perceived impact of body image on QOL. Future research should include more comprehensive measures of impact on QOL, such as the body image QOL inventory,¹⁴ which could not be included in this study because of the participant burden concerns.

Despite these limitations, this study has several theoretical and practical implications. First, we are unaware of any other theory-driven research that has examined the LTPA–body image relationship among men with SCI. Our findings are congruent with Cash's model, which suggests that self-regulatory behaviors (for example, LTPA) are related to body image. However, it appears that among men with SCI, this relationship exists only with regard to functional satisfaction and it is moderated by a perceived impact on QOL. Given the different pattern of findings for appearance and function, future research in this population should consider function and appearance as independent aspects of body image. In particular, the importance of functional satisfaction among men with SCI must not be overlooked. Furthermore, impact on QOL and other moderators should be considered.

Second, from a practical perspective, the relationship between functional satisfaction and LTPA in the presence of a perceived negative impact on QOL should be considered in LTPA prescription. Specifically, practitioners should highlight improvements in physical function and a positive impact on QOL as the benefits of LTPA to encourage men with SCI to participate in LTPA.

In summary, this is the largest study to examine appearance and functional satisfaction among men with SCI. We found that men with SCI are generally satisfied with their appearance and function. Furthermore, the perceived impact of functional satisfaction on QOL moderates the relationship between LTPA and functional satisfaction. Men who are dissatisfied with their function may be motivated to engage in LTPA if they perceive a negative impact on their QOL. Prospective research is needed to examine the causal relationships between body image, impact on QOL and LTPA.

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