Is Spending Nights Away From Home Associated With Participation and Life Satisfaction After Spinal Cord Injury? A Longitudinal Perspective

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Background: Community reintegration after SCI rehabilitation consists of readjustment not only to the home setting but also to the social and occupational spheres, which often require people to spend nights away from home. Because community reintegration contributes to life satisfaction after SCI, it is necessary to investigate how travel participation is related to occupational and social participation and life satisfaction. Additionally, better management of the long-term effects of SCI requires better understanding of the changes in participation and life satisfaction over time. **Objectives:** To examine how participation and life satisfaction change over time following SCI, and to investigate whether spending nights away from home is associated with occupational and social participation and life satisfaction over time. **Methods:** This is a longitudinal analysis of data extracted from the publicly available database of Spinal Cord Model Systems from 1996 to 2016. A generalized linear mixed model was developed to examine the changes of outcome variables over time while controlling demographic variables. **Results:** Travel and social participation declined while life satisfaction increased as people lived longer with SCI, controlling for confounders. No significant change was identified in occupational participation. Spending nights away from home was significantly and positively associated with social and occupational participation and life satisfaction over time. Although travel participation of people with SCI declined over time, its association with social participation strengthened as the number of postinjury years increased. **Conclusion:** Travel participation plays an important role in successful community reintegration. Rehabilitation services and travel services should provide training and resources on travel after SCI for improved participation and life satisfaction. **Key words:** *life satisfaction, longitudinal data analysis, occupational participation, social participation, spinal cord injury, travel*

Spinal cord injury (SCI) is on the rise in the United States.[1-3] An estimated 296,000 Americans were living with SCI in 2020, with about 17,900 new cases each year.[3] A traumatic SCI can have disabling and long-term effects on health and community engagement. Reintegration in community after SCI is often reduced or severely curtailed.[4-6] Community reintegration after SCI consists of not only readjusting to the home setting but also reintegrating to social life and participating in occupational activities such as employment, education, and vocational engagement.[7] Participation in social and occupational activities, such as attending conferences or visiting family and friends, sometimes requires people to be away from their usual residence.[8] People with SCI have often reported environmental and attitudinal barriers when traveling for business or leisure purposes, and these challenges in traveling may hinder community reintegration after SCI.[9] Participation in social and occupational activities has been an important goal of rehabilitation because of its contribution to quality of life and life satisfaction,[10-14] so it is necessary to understand the relationship of travel participation with social and occupational participation and life satisfaction.

In general, participation after SCI is lower than preinjury participation, and life satisfaction is not

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as high as that of people without any disability.[15] In addition, recent literature provides initial evidence that as travel barriers curb or prohibit people's participation in social and occupational activities, the life satisfaction of people with SCI is likely deeply affected.[16] How these participation patterns and life satisfaction after SCI change over time has been understudied. As more people with SCI are surviving many years beyond their injuries, largely due to improved health services, they may experience secondary conditions related to SCI as well as health, psychological, and functional issues related to normal human aging.[17-19] As it is important for people with SCI to make continuous adjustments across their life span,[20] longitudinal examination of their participation and satisfaction over time could offer valuable insights and strategies for long-term management.[21]

Extensive study has been conducted on life satisfaction of people with SCI; research indicates that people can enjoy relatively high life satisfaction after SCI.[15,22] As people's physical and psychological conditions change, their life satisfaction can be expected to change.[23,24] Multiple factors influence an individual's life satisfaction levels at different life stages, however, it is quite complex to study the changes of life satisfaction over time. One of the limitations of the literature has been its reliance on a cross-sectional approach that provides "snapshots" of life satisfaction at specific points in time.[25,26] In the limited research that uses a longitudinal approach to assess long-term life satisfaction after SCI, results are not conclusive. For example, in looking at changes in life satisfaction after SCI, Lude et al.[27] found considerable improvement after rehabilitation up to 2 years postinjury; van Leeuwen et al.[23] found no significant changes between discharge and 2 years later but significant changes from 2 to 5 years after discharge; and Putzke et al.[28] found stabilized life satisfaction after the first year through the fifth year. Others have also confirmed that life satisfaction is initially low after SCI but generally improves to a higher and stable level after the individual adapts to the consequences of the injury.[21,29]

There is no consensus on how social and occupational participation of people with SCI changes over time due to limited longitudinal evidence in the literature.[30] Pershouse et al.'s[21] study that assessed quality of life and function using the Community Integration Measure showed that participation seems to increase over time, although not when adjusted for income level and living situation. Gross-Hemmi et al.[31] found that social participation was stable over the 5-year period they studied; engagement in education exerted the largest impact. After following a group living with SCI for over 40 years, Krause and colleagues[30] found well-adjusted social participation in the first 10 to 15 years and a decline at 25 years. Likewise, changes in occupational activity participation after SCI has not been confirmed.[32] Limited research shows that employment rate initially improves after SCI rehabilitation, but there is premature departure from the workforce as people with SCI age.[30,33] Other research suggests that the change in employment is likely a dynamic process as the importance of factors influencing the need for employment may change at different times.[34]

Travel refers to an individual's movement between different geographic locations, away from their usual residence.[35] People with SCI sometimes need to travel for obligatory tasks such as work or personal business (e.g., medical appointment), but they also desire voluntary and intentional travel (e.g., going on vacation or taking a trip with family and friends).[36] Thus, travel participation differs from but may sometimes overlap with social and occupational participation. Little research has been done to understand the relationship among these different types of participation and the potential role of travel participation in relationship to social and occupational participation and life satisfaction. There is initial evidence in the literature that people travel less often after SCI, whether for leisure or work.[9,37,38] More research is needed, however, to further examine the pattern of travel participation after SCI and its potential associations with social and occupational participation and life satisfaction. To our knowledge, this is the first study to examine the changes in travel participation over time.

Because SCI is a lifelong injury, it is important to conduct longitudinal studies to better understand the transitions of individual participation and how factors such as traveling influence the long-term management of SCI, participation in society, and life satisfaction.[22,25] The longitudinal research

method can control for cross-sectional differences and provide a more complete description of changes over time. Using a longitudinal data set, this study examines how spending nights away from home (as a proxy of participation in travel) relates to occupational, social participation, and life satisfaction over time, which can potentially contribute to the development of predictive models for these long-term outcomes. The dataset was not designed to measure travel participation, so details about the number of nights spent away from home were not available. It is impossible to determine the specific reason each time a respondent spent a night away from home, other than it was not due to hospitalization. Nights spent away from home is used interchangeably with travel participation in this study, but travel participation should not be interpreted exclusively as participation in leisure travel or business travel. This point is further discussed as a limitation of the study. Specifically, the study has two objectives: (1) to examine how occupational, social, and travel participation and life satisfaction change over time after SCI, and (2) to investigate whether travel participation is associated with occupational and social participation and life satisfaction over time after SCI.

Methods

Data source and study population

The study retrieved deidentified, publicly available data from the SCI Model Systems (SCIMS) database managed by the National Spinal Cord Injury Statistical Center (NSCISC). This nationwide database includes information collected through telephone surveys since 1973 from SCIMS nationwide, which are sponsored by the National Institute on Disability, Independent Living, and Rehabilitation Research.[39] Records of individuals with SCI were obtained during inpatient rehabilitation, with follow-up interviews at 1 year postdischarge and every 5 years thereafter.

In the study, we selected respondents with at least one wave of follow-up data during the period of 1996 to 2016 on the key outcome variables: occupational participation, social participation, travel participation, and life satisfaction. The cutoff time was selected because these key variables were added to the survey in late 1995, and only data collected before 2017 were made public. A total of 17,143 participant records were retained for final analyses after excluding patients with missing data on outcome variables.

Measures

Travel participation was measured by the number of nights away from home in the past year, a question in the Craig Handicap Assessment and Reporting Technique (CHART) Mobility scale[40]: "(*If Year 1, since discharge*) In the last year, how many nights have you spent away from your home (excluding hospitalizations)?" The interviewers were instructed to include "any night spent away from a person's usual sleeping environment" as a night away from home, such as "visiting family or friends and spending the night at someone else's house." Then, an explanation was added to the questionnaire in 2011 to specifically describe nights away from home as "not in the hospital, but on vacation, visiting family, holiday stays, etc." The response categories of travel participation included 0, 1–2, 3–4, and 5 or more nights. The number of years since injury was recorded at each survey after the discharge from initial rehabilitation, with response values as 1, 5, 10, 15, 20, 25, 30, 35, and 40 years.

Social participation and occupational participation were measured with CHART's social integration and occupations measures. The total scores of each subscale ranged from 0 to 100, with higher scores indicating a respondent's higher level of participation in social (e.g., "number of contact/months with friends") or occupational activities (e.g., hours per week spent on paid work, parenting, recreational, and home maintenance activities).

Life satisfaction was measured by Diener et al.'s Satisfaction with Life Scale (SWLS).[41] SWLS contained five self-reported items on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*) with questions such as "I am satisfied with my life." Its total scores ranged from 5 to 35, with higher scores indicating higher life satisfaction.

Confounding variables

Research has shown that life satisfaction is significantly associated with an individual's demographic characteristics.[25] To avoid potential

bias and the confounding effect, the baseline demographic characteristics (recorded when first enrolled in the SCIMS) were controlled for in the current analyses, including age at injury (0–14, 15–29, 30–44, 45–59, 60–74, 75+ years), sex, race (White or Other), preinjury level of education (11th grade or less, high school/GED, associate's degree, bachelor's degree, graduate degree, and others or unknown), neurologic impairment at discharge (paraplegia or tetraplegia incomplete, paraplegia or tetraplegia complete, paraplegia or tetraplegia minimal deficit, normal neurologic, unknown), and preinjury marital status (married, not married, or unknown).

Statistical analysis

Generalized linear mixed model (GLMM), which is an extension of the generalized linear model (GLM), was adopted to achieve the study's objectives because the primary responses were repeatedly measured across different time points, and individual participant's responses were likely to be correlated.[42,43] In addition, GLMM can model autocorrelation and accounts for the subject-specific coefficient and unequal intervals among time points within the context of GLMs. Potential confounders that may be associated with key variables and affect the main outcomes were adjusted in the multivariable-adjusted model to examine the trends in key variables and associations of travel participation with outcome variables.

In the GLMM analyses, cases with at least one measure of the key outcome variables were included because GLMM automatically selects the appropriate data for repeated measures while assuming the structure of all unobserved elements (e.g., variability within subjects with only one observation) is the same as that of the elements with more observations. The mean differences for social, occupational, and travel participation and life satisfaction variable changes and their 95% confidence intervals (95% CI) were estimated. We performed the GLMM analyses on the relationships of travel participation with the outcome variables in the models. Because travel participation is an ordinal variable, we also conducted tests for linear trends between travel and outcome variables over time. Statistical significance was defined as $p \leq .05$ in two-tailed significance tests. Analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC).

Results

Descriptive analysis

Table 1 summarizes the frequencies of demographic variables of the sample, including gender, age at injury, race, marital status, and education level at time of injury and neurological impairment category at initial rehabilitation discharge as the study baseline. The study's sample contained 79.5% men and 20.5% women respondents. Almost half of the respondents (48.7%) incurred the injury when they were 15 to 29 years old. Most of the respondents were White (70.7%), married (66.6%), and had a high school degree/GED or less (79.4%). There was a little higher proportion of respondents with incomplete tetraplegia (32.4%) onset than other neurologic impairments. Regarding travel participation, 43.5% of participants had five or more nights spent away from home in the past 12 months, whereas 39.0% of participants did not spend any nights away from home. A much smaller proportion of the participants (17.5%) spent one to four nights away from home.

As **Table 2** shows, among 17,143 participants, the mean scores of social participation and occupational participation were 86.7 (*SD* ±7.9) and 55.4 (*SD* ±38.2), respectively. The mean SWLS score was 20.1 (*SD* ±7.9). **Table 2** also illustrates the means and standard deviations for key outcome variables, along with the frequency of each travel participation level, by every 5 postinjury years.

Trends in participation and life satisfaction after SCI

For the first objective, GLMM results generally indicate that participation in social activities and travel show declining trends after SCI ($p < .01$) after controlling for potential confounding variables (age at injury, sex, race, education, marital status, and neurologic impairment) (**Table 3**). Specifically, the mean difference of social participation decreased (-0.18; 95% CI, -0.21, -0.16) as each year passed. An overall negative trend was also detected for travel participation over the years since injury (*p* value for linear trend test <.01).

Table 1. Demographic and injury characteristics of participants (N = 17,143)

Characteristic	**Frequency (%)**
Age at injury (years)	
0–14	240 (1.4)
15–29	8348 (48.7)
30–44	4272 (24.9)
45–59	2801 (16.3)
60–74	1247 (7.3)
≥75	235 (1.4)
Gender	
Men	13,606 (79.5)
Women	3515 (20.5)
Race	
White	12,119 (70.7)
Other	5042 (29.3)
Preinjury marital status	
Married	11,417 (66.6)
Not married	5682 (33.1)
Unknown	44 (0.3)
Neurologic impairment	
Normal or paraplegia/tetraplegia minimal deficit	110 (0.6)
Paraplegia, incomplete	3156 (18.4)
Paraplegia, complete	4618 (26.9)
Tetraplegia, incomplete	5553 (32.4)
Tetraplegia, complete	3186 (18.6)
Unknown	520 (3.0)
Preinjury level of education	
11th grade or less	4660 (27.2)
High school or GED	8946 (52.2)
Associate or bachelor's degree	2148 (12.5)
Graduate degree	618 (3.6)
Others	771 (4.5)
Nights away from home in the past 12 months (travel participation)	
None	6684 (39.0)
1–2 nights	1499 (8.7)
3–4 nights	1499 (8.7)
5 or more nights	7461 (43.5)

Table 2. Descriptive statistics of participation and life satisfaction over time (N = 17,143)

Variable	No. of years since injury									Pooled mean (*SD*)*
	1	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	
SWLS, mean (*SD*)	19.0 (7.9)	20.3 (7.8)	20.5 (7.8)	21.7 (7.4)	22.5 (7.4)	22.3 (7.8)	22.9 (7.5)	23.6 (7.2)	22.3 (8.3)	20.1 (7.9)
Social participation, mean (*SD*)	87.1 (22.8)	85.2 (24.6)	85.8 (24.0)	87.8 (22.2)	88.0 (22.7)	86.6 (24.1)	85.8 (24.7)	86.0 (23.0)	79.6 (25.9)	86.7 (23.2)
Occupational participation, mean (*SD*)	50.1 (37.8)	57.6 (38.1)	59.2 (38.7)	63.9 (37.4)	65.5 (36.5)	65.3 (37.5)	63.2 (38.2)	63.8 (35.9)	49.4 (35.2)	55.4 (38.2)
Travel participation, *n* (%)										**Total**
0 night	3965 (23.12)	814 (4.75)	471 (2.75)	442 (2.58)	368 (2.15)	264 (1.51)	232 (1.35)	106 (0.62)	22 (0.13)	6684 (38.99)
1–2 nights	843 (4.92)	221 (1.29)	111 (0.65)	116 (0.68)	93 (0.54)	51 (0.30)	47 (0.27)	14 (0.08)	3 (0.02)	1499 (8.74)
3–4 nights	861 (5.02)	196 (1.14)	130 (0.76)	101 (0.59)	79 (0.46)	59 (0.34)	46 (0.27)	24 (0.14)	3 (0.03)	1499 (8.74)
5 or more nights	3433 (20.03)	1,090 (6.36)	752 (4.39)	756 (4.41)	660 (3.85)	402 (2.34)	247 (1.44)	106 (0.62)	15 (0.09)	7461 (43.52)

Note: SWLS = Satisfaction with Life Scale.

Table 3. The longitudinal associations of travel participation (ordinal variable) and the number of years since injury with life satisfaction and occupational and social participation

Variable	Multivariable-adjusted model[a]		
	Estimated effect	**95% confidence interval**	***p* value**[*]
Association between no. of years since injury and participation and life satisfaction			
Social participation	-0.18	-0.21, -0.16	<.01
Occupational participation	-0.01	-0.05, 0.03	.65
Life satisfaction	0.13	0.12, 0.14	<.01
Travel participation *Linear trend test*			<.01[**]
Association of travel participation with social and occupational participation and life satisfaction			
Social participation			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	6.15	5.30, 6.99	
3–4 nights	8.15	7.34, 8.97	
5 or more nights	11.04	10.50, 11.59	
Linear trend test			<.01[**]
Occupational participation			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	8.17	6.84, 9.49	
3–4 nights	14.63	13.37, 15.90	
5 or more nights	20.23	19.38, 21.07	
Linear trend test			<.01[**]
Life satisfaction			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	0.73	0.45, 1.01	
3–4 nights	1.79	1.52, 2.06	
5 or more nights	2.77	2.58, 2.95	
Linear trend test			<.01[**]

(continues)

Table 3. The longitudinal associations of travel participation (ordinal variable) and the number of years since injury with life satisfaction and occupational and social participation *(cont.)*

Variable	Multivariable-adjusted model[a]		
	Estimated effect	**95% confidence interval**	***p* value***
Association of travel participation with occupational participation, social participation, and life satisfaction by no. of years since injury			
Social participation			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	6.16	4.92, 7.40	
3–4 nights	7.40	6.18, 8.62	
5 or more nights	9.51	8.73, 10.30	
Travel participation x no. of years since injury			<.01
No travel x no. of years since injury	1.00	(--)	
1–2 nights x no. of years since injury	0.00	-0.08, 0.08	
3–4 nights x no. of years since injury	0.06	-0.02, 0.14	
5 or more nights x no. of years since injury	0.13	0.08, 0.17	
Occupational participation			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	7.83	5.90, 9.76	
3–4 nights	16.15	14.26, 18.05	
5 or more nights	19.52	18.30, 20.74	
Travel participation x no. of years since injury			.03
No travel x no. of years since injury	1.00	(--)	
1–2 nights x no. of years since injury	0.02	-0.11, 0.15	
3–4 nights x no. of years since injury	-0.13	-0.26, -0.01	
5 or more nights x no. of years since injury	0.05	-0.02, 0.13	

(continues)

Table 3. The longitudinal associations of travel participation (ordinal variable) and the number of years since injury with life satisfaction and occupational and social participation *(cont.)*

Variable	Multivariable-adjusted model[a]		
	Estimated effect	**95% confidence interval**	***p* value**[*]
Life satisfaction			
Travel participation			<.01
No travel	1.00	(--)	
1–2 nights	0.86	0.45, 1.27	
3–4 nights	1.90	1.49. 2.30	
5 or more nights	2.83	2.57, 3.10	
Travel participation x no. of years since injury			.84
No travel x no. of years since injury	1.00	(--)	
1–2 nights x no. of years since injury	-0.01	-0.04, 0.02	
3–4 nights x no. of years since injury	-0.01	-0.03, 0.02	
5 or more nights x no. of years since injury	-0.005	-0.02, 0.01	

[a]Model adjusted for all demographic characteristics, including gender, age, race, marital status, education level, and neurological impairment at the study baseline.
[*]*p* value was estimated from generalized linear mixed model across the key variables.
[**]*p* value for linear trend test of ordinal categorical variable.

While both social and travel participation decreased over time, a significant positive relationship was observed among life satisfaction and postinjury year after controlling for potential confounding factors ($p < .01$). That is, as the individual lived longer with SCI, the estimated level of life satisfaction increased by 0.13 unit each year (95% CI, 0.12, 0.14). However, the estimated effect of occupational participation between individual observations with a yearly increase in time of postinjury was found not to be statistically significant ($p = .65$) after being adjusted by the potential confounders. Although there seemed to be a declining trend in occupational participation over time (estimated effect = -0.01), the change was not statistically significant.

Longitudinal associations of travel with participation and life satisfaction

GLMM analysis was conducted to achieve the second objective. As seen in **Table 3**, spending nights away from home was positively associated with life satisfaction and social and occupational participation over time, after controlling for potential confounders. Results of the multivariable analysis show that respondents' life satisfaction improved as travel frequency increased. Estimated effects for 1–2 nights, 3–4 nights, and 5 or more nights spent away from home were 0.73 (95% CI, 0.45, 1.01), 1.79 (95% CI, 1.52, 2.06), and 2.77 (95% CI, 2.58, 2.95), respectively, with 0 night as the reference group. Social participation was also enhanced with

the increase in number of nights spent away from home. Estimated effects for 1–2 nights, 3–4 nights, and 5 or more nights were 6.15 (95% CI, 5.30, 6.99), 8.15 (95% CI, 7.34, 8.97), and 11.04 (95% CI, 10.05, 11.59), respectively, with 0 night as the reference group. Moreover, occupational participation greatly increased as respondents spent more nights away from home, especially for respondents who spent at least 5 nights away from home (estimated effect = 20.23; 95% CI, 19.38, 21.07), compared with those who did not travel. Linear trends were found for travel with life satisfaction (p value for linear trend test <.01), social participation ($p < .01$), and occupational participation ($p < .01$).

When considering the number of years since injury, spending nights away from home continued to be significantly and positively associated with life satisfaction ($p < .1$) and social ($p < .1$) and occupational participation ($p < .01$). In addition, a synergistic impact between the number of years since injury and travel participation on social participation was found ($p < .01$), after controlling for all potential confounding factors. As the number of years since injury increased, the increasing estimated effect of social participation was in line with the increasing number of nights away from home. Although a synergistic effect of travel and the number of years since injury was detected on occupational participation ($p = .03$), the estimated effects of the different travel categories did not show a consistent trend over the number of years since injury. Only the "3–4 nights spent away from home" had a slight negative association (estimated effect = -0.13, 95% CI, -0.26, -0.01). We did not see any significant interaction effect of the number of nights spent away from home in the past year and number of years since injury on life satisfaction, even after extensive adjustment for potential confounding factors ($p = .84$).

Discussion and Conclusion

Study results indicate that after SCI, participation in social activities and travel decreases over time, with demographic and injury characteristics adjusted. These findings are consistent with previous studies showing lowered level of participation in society in general after SCI,[6] and they confirm that the declining pattern continues over time. Although lowered level of participation can be a normal aging effect, participation can decline for people with SCI at a much faster rate than for people without SCI because they experience lowered level of mobility due to both SCI-related conditions and normal aging effects.[17] Compared to people without disability, people with SCI are likely to reduce their travel participation at a higher rate or even stop traveling at a much younger age.

Results show that the mean scores of occupational participation were relatively low over the years since injury (pooled mean = 55.4, range, 0 to 100), but we did not find any significant changes over time in the multivariable-adjusted model for occupational activities after SCI. In addition, although an interaction effect of travel and the number of postinjury years was found on occupational participation, the estimated effects did not show a consistent trend. It is thus likely that people's participation in occupation-related activities will change at different life stages[33] and not follow a linear trend over the life span. That is, the need for occupational activities of employment, schooling, and parenting will lessen as the family life stage changes, whereas participation in recreation activities and home maintenance may not change at the same rate. The study of occupational participation can thus be rather complex, and future research should take into consideration people's needs for different occupational activities at different times of their life. Nevertheless, life satisfaction was found to increase over time. Several studies have also confirmed that people with SCI can still have improved life satisfaction as they get older and live with SCI longer.[44,45] A plausible explanation for this outcome has been provided by Jörgensen et al.,[22] who proposed that as people's daily existence becomes stabilized after SCI, they can enjoy more aspects of their life. Life satisfaction refers to the individual's subjective judgment upon their current life situation, so it is usually not found to be significantly correlated with disability characteristics.[15]

An important finding of the study is that spending time away from home is significantly positively associated with life satisfaction and participation in social and occupational activities over time. Without considering the effect of the number of

years since injury on travel participation, the ability to spend time away from home is significantly positively associated with people's opportunities for participation in social activities, employment, and other occupational activities. Travel participation is also found to be associated with people's life satisfaction over time. Notably, the estimated effect of travel on occupational participation is found to be highest among all outcome variables.

Even considering the effect of the number of years since injury, travel participation is positively associated with social and occupational participation and life satisfaction after SCI. In other words, travel participation continues to be positively associated with social and occupational participation and life satisfaction as time postinjury extends. Whereas both travel participation and social participation decline over time, travel participation is found to be positively related to social participation. The significant synergistic effect on social participation between travel and number of years since injury means that the association between travel and social participation is strengthened as time postinjury extends. This implies that social participation may involve more travel as people live longer with SCI.

It is worth noting that our findings of the significant associations of travel participation with occupational and social participation and life satisfaction over time do not specify the relationship between travel participation and the outcome variables. Nevertheless, the study provides evidence that more research is needed to investigate the specific role travel plays in the contribution of participation to life satisfaction. In addition, future research is needed to investigate how various types of participation and life satisfaction interact to influence each other.

Implications

Community reintegration following SCI has and continues to be a top short- and long-term rehabilitation goal.[46,47] The current study provides evidence that more frequent travel participation is significantly associated with higher levels of key success markers of community reintegration in the context of participation in occupational and social spheres.[48] As such, it is important that clinicians help and encourage people with SCI to participate in travel-related activities. Targeted outcomes related to travel should be considered for inpatient rehabilitation after SCI for patients who need to travel home after rehabilitation and for continued education related to full integration into their community and society at large after SCI. Helping patients understand travel barriers and facilitators after SCI will likely enhance their competence in travel. Efforts in inpatient rehabilitation are needed to identify travel resources and provide training to help patients build knowledge and skills in overcoming barriers so those who are newly injured may feel more confident in their ability to adapt to new practices while traveling and subsequently travel more often. Additionally, rehabilitation professionals should dedicate resources related to travel education after SCI for those who are aging with an SCI to improve participation in this realm as well as the social and occupational spheres. Doing so may significantly improve life satisfaction within this population throughout the life span.

Management and employees of the travel industry should be educated about the importance of travel for people with SCI. As people live longer with SCI, they may engage more in travel when participating in social activities. Collaborative relationships can be explored between travel services and rehabilitation hospitals to provide resources and education for people with SCI who wish to travel and to help the travel industry to be more accessible for people with disabilities. Further study is needed to assess the longitudinal relationship between early and ongoing travel education, community reintegration, and satisfaction with life.

Limitations

There are some limitations in the study, which also provide directions for future research. First, measures of key variables were self-reported, and thus the residual confounders could not be fully ruled out. Although the selection of potential confounders is based on the literature, the dataset is limited in providing valid data on certain variables. For example, injury-related mobility characteristics were not included as a confounder due to the large amount of missing data in the sample. Second, the operationalization and measurement of travel participation are confined to the number of nights spent away from home in the last 12 months. No information is available in the dataset on the reasons

why people were traveling away from home. Results and discussions in the study on travel participation therefore should not be viewed as only referring to participation in leisure travel or tourism because people can be away from their own home for work, personal business, or other reasons. The association of travel with participation and life satisfaction can be different for varied types of travel, but the study did not have the data to examine the association in detail. More research is needed on the topic, and future studies should include measures for different types of travel participation. In addition, using the current travel participation measure, respondents were either in the lowest or the highest category of travel participation, leaving few respondents at the in-between categories. This is an inherent limitation of the dataset. People with SCI seem to be much more active in travel, especially after the first year of rehabilitation, so measures of travel participation in future studies should reflect more variations in frequencies. Third, we only used the baseline measurements of respondents' demographic characteristics as covariates although they were measured repeatedly. Thus, study results do not reflect potential changes of respondents' demographic characteristics. Further studies on longitudinal relationships between participation and life satisfaction may be analyzed at different life stages to include demographic characteristic changes.

Conflicts of Interest

The authors declare no conflicts of interest.

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