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Original Research

Developing a Facilitators Scale in the Context of Travel: ReTRIP

Shu Cole, PhD [a], Dubravka Svetina Valdivia, PhD [b]

[a] *Indiana University School of Public Health-Bloomington, Bloomington, Indiana*
[b] *Department of Counseling and Educational Psychology, Indiana University, Bloomington, Indiana*

KEYWORDS
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Abstract *Objective:* To develop a scale for measuring factors that facilitate participation of people with spinal cord injury (SCI) in travel-related activities: Removing Travel Restrictions Influencing Participation (ReTRIP).
Design: A mixed-method approach where in the qualitative phase, items were developed and written based on results of interviewers with different stakeholder groups and in the quantitative phase, survey data were collected to examine the psychometric properties of the scale.
Setting: Home, work, and community settings.
Participants: People living with SCI, caregivers or family members, therapists, travel professionals (N=333).
Interventions: None.
Main Outcome Measures: An 11-item ReTRIP scale that measures the facilitators that enhance the travel participation of people with SCI.
Results: In the qualitative phase of the study, 5 categories of travel facilitators were identified based on semistructured in-depth interviews with 83 respondents from 4 stakeholder groups. Initial items of the ReTRIP scale were written based on the travel facilitators identified. Items in the scale were then revised based on results of cognitive interviews and an expert panel review. In the quantitative phase, a total of 250 patients enrolled in a Spinal Cord Injury Model System were systematically selected to report their experience with each travel facilitator. Item-response theory—based Rasch analysis revealed that the 11-item ReTRIP has acceptable psychometric properties, containing 2 main dimensions: industry-oriented facilitators (6 items) and self-oriented facilitators (5 items).
Conclusions: The 11-item ReTRIP scale demonstrates promising psychometric properties, allowing researchers and clinicians to potentially use self-reported environmental factors that are

List of abbreviations: CFA, confirmatory factor analysis; DIF, differential item functioning; EF, environmental factor; ICF, International Classification of Functioning, Disability and Health; PCA, principal component analysis; PCM, partial credit model; RSM, Rasch-Andrich rating scale model; SCI, spinal cord injury; ReTRIP, Removing Travel Restrictions Influencing Participation.

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beneficial for people's participation in travel after SCI to properly design client-centered interventions. Future studies using a larger sample are needed to validate the scale.

Each year, approximately 17,000 spinal cord injuries (SCIs) occur largely because of automobile accidents, violence, falls, and sports-related activities.[1] Traumatic injury to the spinal cord is found to affect the sensory and motor functions, which can cause sense and/or mobility impairments that leave life-long disabilities and reduced engagement in overall life activities.[2] According to data published by the National Spinal Cord Injury Statistical Center in 2019, less than 1% of these patients achieve complete neurologic recovery when discharged from hospitals,[1] and in Carpenter et al's study,[3] 81.5% of respondents with SCI reported limitations to participation in life activities.

Participation in society is a vital part of the human experience, and research has shown consistently that participation of people after SCI in meaningful work and leisure is directly related to their satisfaction in life.[4,5] In the mainstream United States, however, participation in work, school, leisure, and social activities requires travel to some degree, and the mobility impairments experienced by people after SCI may make travel more difficult. Indeed, travel research indicates that people with disabilities reported more difficulties and barriers, and less satisfied experiences when traveling either locally or long distances.[6,7]

Reduced levels of participation in various life activities of people after SCI is widely noted in the literature,[8-10] and consequently, there is increasing research interest in identifying and examining the factors that inhibit or facilitate the participation of people after SCI. Much of this line of research follows the conceptual framework set by the World Health Organization's International Classification of Functioning, Disability and Health (ICF), which postulates that participation in life activities of people with SCI is the result of interactions among their health conditions, personal factors (eg, demographics and motivation), and environmental factors (eg, social attitudes and physical environment). Despite the copious effort in extant literature on barriers to and facilitators of participation after SCI, research on participation in travel-related activities for people with SCI is limited.

Although ICF offers a conceptual framework for participation, there are still challenges in understanding the factors that influence participation of people with SCI. One well-documented issue is that the relationships between environmental factors (EFs) and participation, as postulated by ICF, have not been empirically supported consistently, in part because of the challenges in measuring EFs and participation. Many studies have been conducted to develop reliable measures of EFs, including a more recent effort of developing a comprehensive item banks for EFs measures[11]; researchers, however, are still calling for additional effort to develop robust measures of EFs.[12-14] Reviews of popular EFs measurement scales can be found in Reinhardt and Post[15] and Heinemann et al.[14]

ICF has generated optimism for finding a framework to quantify EFs, but researchers are often reminded that ICF is a "descriptive tool"[13(p1739)] and does not offer sufficient clarity or specificity for measurement strategies.[16] ICF classifies all EFs into 5 broad categories (ie, products and technology; natural environment and human-made changes to environment; support and relationships; attitudes; and services, systems, and policies), containing multiple sublevels in each category. Quantifying these factors is difficult because of not only the large number of factors but also the inconsistent specificity of each EF. For example, Light Intensity and Legal Systems are listed in the same category level. Yet Light Intensity may be operationalized as indoor or outdoor light, while the various mechanisms in a country's legal system can be difficult to quantify. Thus, the concept boundaries for Light Intensity are much narrower than those of Legal Systems.

The purpose of this study is to explain the development of Removing Travel Restrictions Influencing Participation (ReTRIP), a scale measuring factors that facilitate participation of people with SCI in travel-related activities, and to demonstrate the scale's psychometric properties. This article follows a previous publication on the development of a travel barriers scale called TRIP[17] using the same approach. Our approach of developing independent barriers and facilitators scales (TRIP and ReTRIP) that are context- and disability-specific follows Whiteneck and Dijkers[18] and Magasi et al,[12] where advantages include ease of scale use and relevance to targeted clients. Research shows relationships between EFs and participation can be dynamic, where different types of participation may have different influential EFs in various contexts for different populations.[19,20] Using comprehensive measures developed based on ICF to identify EFs that affect participation of a specific population can thus be a hindrance in clinical settings. While existing EF measures also tend to focus on barriers, distinctions between barriers and facilitators are not evident in the literature.[21] Independent barriers and facilitators scales that are context- and disability-specific thus allow researchers to further examine relationships between barriers and facilitators and their potential interactions with participation. In addition, identification of travel barriers and facilitators can help rehabilitation practitioners and policy makers to develop interventions and policies that optimize the environment that enhances participation of people with SCI.[22]

Methods

This study adopts a mixed-methods approach in 2 phases. In phase I, qualitative interviews with 4 stakeholder groups were conducted to identify relevant travel facilitators.

Items measuring facilitators were developed and tested in the quantitative phase II, where psychometric properties of items were examined through exploratory and confirmatory factor analysis and Rasch modeling. Institutional review board approvals were obtained in 2015 and 2016 from the institutions involved in both phases.

Phase I: qualitative interviewing and item writing

Items measuring travel facilitators were written based on 83 qualitative interviews with 39 individuals living with SCI, 24 caregivers or family members, 9 recreational or occupational therapists, and 11 travel agents specializing in travel services for special needs populations. Individuals with SCI enrolled in one of the SCI Model Systems, funded by the National Institution on Disability, Independent Living and Rehabilitation Research, who were due for their routine anniversary survey were invited to join the study. Interviewees were also asked to refer their caregivers or family members for voluntary interviews. Snowball sampling technique was used to recruit therapists and travel professionals, where interviews started with researchers' acquaintances, who in turn referred more interviewees.[23] Respondents were asked to identify and discuss environmental factors that helped people with SCI participate in travel-related activities.

Sample size was determined based on content saturation of interviews in each stakeholder group. The constant comparative method[24] was adopted to analyze interview texts transcribed verbatim. NVivo 11[a] was used for data storage and analysis. Two analysts created a coding summary, and others performed triangulation for analysis validity. A set of travel facilitator categories that emerged guided ReTRIP's development. Item writing and development followed guidelines of DeVellis[25] in number and wording of items and response format.

Phase II: quantitative psychometric evaluation

Patients due for their anniversary survey (February 2016-February 2017) in the same SCI Model Systems as above were invited to participate in a telephone survey to evaluate travel facilitator items in ReTRIP. A total of 250 people originally completed the survey; 1 person was omitted because of extensive missing data, leaving a sample of 249. The items' missing data points were slightly over 2% on average, while most items had no missing data. Analyses were based on all available data whenever possible, with missing data treated as missing at random.

Multiple evidence sources were gathered to examine psychometric properties of the newly developed ReTRIP scale, including examination of dimensionality of item responses, differential item functioning (DIF), and data-model fit using Rasch-Andrich Rating Scale Model (RSM).[26]

Dimensionality assessment

Dimensionality of item responses was examined via principal components analyses (PCA; exploratory approach) and confirmatory factor analyses (CFA) based on PCA solutions. The data set was randomly split into halves, where PCA was conducted on the training sample (n = 125) followed by the CFA model using the test sample based on exploratory analyses findings (n = 124). PCA analyses were fit in SPSS 25[b] using Promax rotation, while CFA analysis was conduced in *Mplus*.[c]

DIF analysis

To determine whether items function equally across predetermined groups, we examined DIF among the groups across age, educational level at time of injury, injury level, injury completeness, and number of years since injury. Analyses were conducted separately for each grouping variable using the lordif[d] package via the lordif function in R.[e]

Rasch analysis in R

To achieve the main goal of instrument development, we focused on data-model fit analyses of items by fitting RSM using the eRm[f] package in R. Conditional maximum likelihood was used in estimation; missing values in the data matrix were allowed whenever possible. Item fit was evaluated using traditional Rasch modeling measures, including INFIT and OUTFIT statistics and consistent ordering of average measure values across item categories.[27] We then examined classical item analysis (point-biserial correlations and α if deleted) and homogeneity of items and internal consistency (via α) to identify psychometric qualities of the proposed items. Wright Maps were used to demonstrate item response model results.

Results

Phase I: qualitative interviews and item revisions

Respondents from the 4 stakeholder groups agreed that 5 categories of EFs facilitated travel participation of people with SCI: (1) **information** on accessibility of travel services and destinations available to people with SCI when planning/taking a trip; (2) **knowledge** of what people with SCI understand about their needs and rights, travel tips, and how to problem solve when traveling; (3) **technology and devices** that can help people with SCI experience successful travel; (4) **accessibility** to facilities and services in travel and the extent to which travel-related businesses/services accommodate customers with SCI to ensure access and use; and (5) **support**, including travel service employees' willingness to help and support from family and/or friends who can travel with individuals with SCI.

A total of 22 items were initially written to measure the 5 categories of travel facilitators, each describing a specific facilitator (eg, transportation that accommodates wheelchairs). Respondents rated on a 5-point scale about how helpful each factor was when traveling outside their community or when deciding to travel away from home (1 = no help at all, 2 = helps a little, 3 = helps somewhat, 4 = helps quite a bit, 5 = helps very much).

Cognitive interviews were conducted among 7 previously interviewed individuals with SCI to verify the clarity of each facilitator item. Seven items considered unclear or repetitive were deleted. Some items were revised to improve their measurements. The revised scale with 15 items was evaluated by a 9-member expert panel (topic experts and PhD students) for content validity. Another item was

deleted, and more wording changes were made. A 14-item ReTRIP scale was then finalized for quantitative analyses.

Phase II: quantitative study and psychometric analysis

Demographic information and data

Of the 249 respondents in phase II, almost three-fourths (73%) were male and 90% identified as white. Median age was 53 years, ranging from 21-83 years. Average years post injury was 25 years, with a median of 30 years ranging from 5-40 years. About half of the respondents were working (49%), a little over one-quarter (28%) were unemployed, and 14% were retirees.

Although the facilitator items were initially measured on a 5-point scale, because of low counts in ratings 1-3 on several items, rating categories of 1-3 were collapsed into 1 for analysis. For both CFA and Rasch analyses, low counts in some categories can lead to unstable results.

Dimensionality assessment

Examination of PCA

Results of PCA on the 14 items show that while 4 components had eigenvalue>1, the first 2 components explained approximately 40% of variance, and their respective ratios were much larger than that of the remaining 2 components. Pattern and structure matrices suggest that all but 3 items loaded on a unique factor (items of "having own vehicle" and "Smartphone" had low loadings, and item "the internet" had moderate loadings across multiple factors). Eleven items having reasonable association with a single component were thus used in subsequent CFA analyses.

Results of CFA supported a 2-factor solution, evidenced by reasonable model fit (χ^2 [43]=60.42, P=.04; root mean square error of approximation=.057 [.90 CI of 0.012-0.089]; comparative fit index=0.970, Tucker-Lewis index=0.962, standard room mean square residual=.070). Factor 1 included 6 items (1-6) that were industry-oriented facilitators, such as "information about what is and is not accessible where I'm traveling," and factor 2 contained 5 items (7-11) that were self-oriented facilitators, such as "ability to problem-solve during travel." The correlation between the 2 factors was 0.396. PCA and CFA results imply it is reasonable to treat ReTRIP as a 2-dimensional scale, meaning 2 dominant traits underlie responses to the 11 items. Because of small sample size, in subsequent analyses, we fit individual unidimensional Rasch models and conducted DIF analyses on each set of items, factor 1 and factor 2, separately.

DIF analyses

DIF analyses were conducted based on dichotomizing the grouping variables of age (split at median age 53y), educational level (no college vs some college), injury level (paraplegic vs tetraplegic), injury completeness (paraplegic complete, paraplegic incomplete, tetraplegic complete, tetraplegic incomplete), and number of years since injury (split at 25y or fewer vs 30y or more). No items associated with factor 1 exhibited DIF across any groupings (table 1). In factor 2, only 2 items were found to have DIF: item 10 ("my ability to problem-solve during travel") having education level DIF, and item 11 ("having people to travel with me") illustrating injury level DIF. Visual examinations of item characteristics curves for items exhibiting DIF reveal moderate to small differences, however. Further information (including analysis with a larger sample) is needed to determine if the 2 items should be deleted. Considering the

Table 1 DIF analyses summary for various grouping variables with sample size per group information for each factor separately

Grouping Variable	No. of Groups	Sample Size per Group				DIF Items	
		1	2	3	4	Factor 1	Factor 2
Age	2 groups (by median of 53 years) 1: ≤53 y 2: >53 y	131	118			None	None
Educational level	2 groups 1: High school or GED and lower 2: some college and above	105	143			None	10
Injury level	2 groups 1: paraplegic 2: tetraplegic	117	132			None	11
Injury completeness	4 groups 1: paraplegic incomplete 2: paraplegic complete 3: tetraplegic incomplete 4: tetraplegic complete	52	65	80	52	None	None
Years since injury	2 groups 1: 25 y or fewer vs 2: 30 y or more	123	126			None	None

Abbreviation: GED, general equivalency diploma.

relevance of the items' content and descriptive statistics, we decided to retain all 11 items for Rasch analysis.

Rasch-Andrich ratings scale model

Industry-oriented facilitators

In RSM, separation reliability of the 6 items was 0.802 with a mean square measurement error of 0.397. Model comparison with a more general partial credit model (PCM) was conducted to examine adequacy of the RSM.[28] The likelihood ratio test suggested that PCM did not statistically significantly improve RSM fit (χ^2 [5]=6.83, P=.23). Further, item fit statistics for factor 1 in table 2 suggested that the items yielded adequate fit. Specfically, the INFIT and OUTFIT statistics ranged from 0.848 (item 1) to 1.140 (item 3) and 0.850 (item 5) to 1.113 (item 3), respectively.

Classical item analysis indicated that all items were related to the total score in moderate to moderately high relationship, where point-biserial correlations ranged from 0.480 (item 6) to 0.677 (item 4), and overall coefficient α was 0.814. Deletion of any item would yield a lower α coefficient, further suggesting that items as a set should be retained.

Self-oriented facilitators

For the 5 items associated with self-oriented facilitators, separation reliability was 0.594, with the mean square measurement error of 0.442. A PCM was fitted to the data, where the likelihood ratio test did not show that PCM significantly improved model fit of RSM (χ^2 [4]=6.33, P=.18). Item fit statistics of factor 2 (see table 2) suggested that the 5 items yielded adequate fit, where INFIT and OUTFIT statistics ranged from 0.724 (item 10) to 1.187 (item 11) and 0.699 (item 9) to 1.215 (item 11), respectively.

Classical item analysis demonstrated that the 5 items were related to the total score in small to moderate degrees, where point-biserial correlations ranged from 0.226 (item 11) to 0.489 (item 9), and overall coefficient α was 0.607. Deletion of item 11 would increase α to 0.627. Item 11 was retained in the study, however, because the increase was slight and item content was important for construct representiona. Thus, further testing with a larger sample is needed to offer more insights.

Wright Maps in fig 1 show the relationship between an item's and a person's parameters. Two panels provide visual representation of respondents' distributions (line chart on the left) and corresponding items' locations (on the right of graph) for industry- and self-oriented facilitators. V1 and V2 are the thresholds on the logit scale for each item. Figure 1A indicates that industry-oriented facilitator items are generally located in the middle of distribution, where most respondents are located. Items' thresholds are reasonably closely related, indicating a somewhat limited range for their locations. Figure 1B shows that items' locations are more spread out and distributed to the left, while more respodnents were located on the right tail of the person's distribution. In other words, for self-oriented facilitators, additional items should be added on the upper end of the continuum to better caputre responses in those locations.

Figure 2 shows the complete ReTRIP scale with instructions.

Table 2 Item fit statistics for ReTRIP items

Item No.	Item Description	χ^2	*df*	*P*	MNSQ		pbis
					INFIT	OUTFIT	
	Factor 1: Industry-Oriented Facilitators						
1	Accessible information	161.15	189	.93	0.848	0.867	0.622
2	ADA-compliant buildings	164.38	190	.91	0.861	0.888	0.625
3	Allowing wheelchair users in front of the line	213.20	186	.08	1.140	1.113	0.460
4	Transportation for wheelchairs	136.69	185	.99	0.735	0.784	0.677
5	Industry staff make an effort to accommodate	165.19	190	.90	0.865	0.850	0.599
6	Travel tips shared by people with SCI	210.17	190	.15	1.100	1.082	0.480
	Factor 2: Self-Oriented Facilitators						
7	Knowledge of asking right questions	172.02	179	.63	0.956	0.975	0.352
8	Having a well-planned trip	179.65	179	.47	0.998	1.018	0.311
9	Friendly people willing to help	131.50	179	.99	0.731	0.699	0.489
10	Ability to problem solve	130.35	179	.99	0.724	0.765	0.470
11	Having people to travel with	213.64	179	.04	1.187	1.215	0.226

Abbreviations: ADA, Americans with Disabilities Act; MNSQ, mean-square values for INFIT and OUTFIT statistics as provided by eRm; pbis, point biserial.

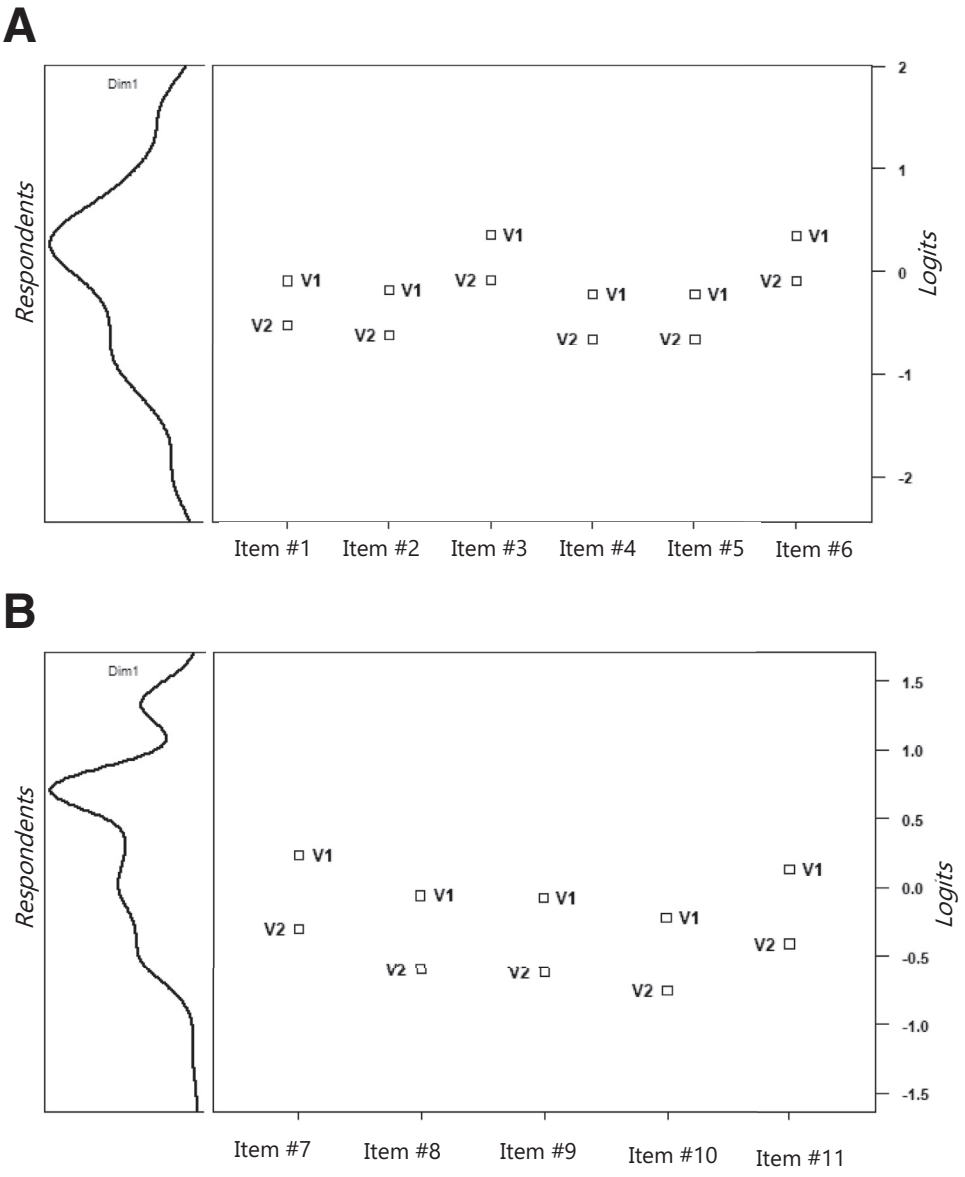

Fig 1 Item-person maps for the 2 respective factors on ReTRIP scale. Dim 1: Distribution of respondents. (A) Item-person map for industry-oriented facilitators. (B) Item-person map for self-oriented facilitators. Abbreviation: V1 and V2, thresholds on the logit scale for each item.

Discussion

On a global level, ReTRIP was found to be multidimensional, with 2 main components: facilitators that are industry oriented, referring to helpful factors offered by travel services or their employees; and self-oriented facilitators, including factors that are helpful for travel through efforts of individuals with SCI themselves or people around them. Results of quantitative analyses separate the support of travel service employees from that of people around individuals with SCI whether they are caregivers, family members, or other travelers they interact with. Study respondents emphasized their abilities that enhance travel experience, such as "knowledge on how to ask the right questions about your accessibility needs," "having a well-planned trip beforehand," and "ability to problem-solve during travel."

Interestingly, these self-directed facilitators seem to combine environmental factors with individual abilities because they are likely outcomes after people with SCI internalize the support, education, and information they receive from various health, community, and travel services. The 2-factor model fit seems reasonable, where their relatively weak correlation justifies the separate use of facilitator factors (ie, scores on each factor). Psychometric properties of items associated with each facilitator factor were generally good; it is expected that results would hold in a larger sample.

Items mostly had strong relationships with respective latent factors, except that 3 items (smartphone, own

[*Interviewer: If the respondent has traveled outside his/her community since injury, use this instruction*]
The following things can be helpful to people with SCI when they travel outside of their community. Please rate how much each of the following has helped you in your past travels, using the scale provided below.

[*Interviewer: If the respondent has never traveled outside his/her community since injury, use this instruction*] The following things can be helpful to people with SCI when they travel outside of their community. Please rate the following items based on how much you think each of them would help you if you decide to travel, using the scale provided below:

1= no help at all; 2 = helps a little; 3 = helps somewhat; 4 = helps quite a bit; 5 = helps very much

1)	information about what is and is not accessible where I'm traveling..	1	2	3	4	5
2)	buildings designed in compliance with the ADA where I travel.....	1	2	3	4	5
3)	travel services & locations that allow wheelchair users to be in the front of the line.....	1	2	3	4	5
4)	transportation that accommodates wheelchairs.....	1	2	3	4	5
5)	travel industry staff who make an effort to accommodate me.....	1	2	3	4	5
6)	travel experiences shared by other people with SCI.....	1	2	3	4	5
7)	my knowledge on how to ask the right questions about my accessibility needs.....	1	2	3	4	5
8)	having a well-planned trip beforehand.....	1	2	3	4	5
9)	friendly people who are respectful and willing to help.....	1	2	3	4	5
10)	my ability to problem-solve during travel.....	1	2	3	4	5
11)	having people to travel with me.....	1	2	3	4	5

Fig 2 ReTRIP: a travel facilitators scale. Abbreviation: ADA, Americans with Disabilities Act.

vehicle, the Internet) did not show relevance in the facilitators scale. A possible explanation echoed by Reinhardt and Post[15] is that, although the technology and device are considered very helpful, respondents may be taking them for granted after frequent use. Another point is that item 9 has little value variation (ie, 81% of respondents rated it as "very helpful") and thus psychometrically is not considered a useful item for capturing different response levels.

The 2-dimensional structure of travel facilitators suggests the perspectives of individuals with SCI that can be helpful for travel businesses and services when improving their capacity to serve people with disabilities and for clinicians and policy makers when designing and developing interventions for improving participation. People with different social demographic and injury characters may have different needs and thus will focus on different types of facilitators. Consequently, information on travel facilitators is useful for developing customized travel services and client-centered interventions for individuals with SCI, which are likely to be more effective in enhancing these individuals' participation.[29]

Study limitations

Because of the exploratory nature of the study and small sample size, the current study does not provide a full profile on travel facilitators for people with SCI. ReTRIP uses a 5-point scale, but responses on the lower rating 1-3 categories are relatively low. Increasing sample size might mitigate some low-count categories for certain items. Differentiation of how much help a specific facilitator is may also not be perceived as straightforward, for example, if a factor "helps a little," is it meaningfully different from "no help at all" or "helps somewhat"? Future studies can conduct cognitive interviews to further examine how participants perceive the scale.

The ReTRIP scale was developed based on 5 categories of travel facilitators identified by 4 stakeholder groups through qualitative interveiws. It might be useful to develop several additional items (which can be built from additional cognitive interveiws mentioned above) so that with an increased sample size alignment between persons and items is better achieved.

Conclusions

This pilot work demonstrates the promise of ReTRIP as a reliable measure for factors perceived by people with SCI as facilitating their travel participation. Advantages of this scale include its relevancy in terms of interest and potential ease of use in clinical settings. Data collected using ReTRIP can reveal individual differences in travel participation facilitators and will thus aid in developing client-centered interventions. To further validate the scale, future studies need to test it with more representative and larger sample sizes and possibly add more items in each component of the travel facilitators.

Suppliers

a. NVivo version 11; QSR International.
b. SPSS version 25; IBM.
c. *Mplus* version 7.2; Muthén and Muthén.

d. lordif R package version 0.3-3; Seung W. Choi.
e. R; R Foundation for Statistical Computing.
f. eRm version 0.16-2; Patric Mair.

Corresponding author

Shu Cole, PhD, 1025 E 7th St, SPH 133, Bloomington, IN 47405. *E-mail address:* colest@indiana.edu.

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References

1. National Spinal Cord Injury Statistics Center. Spinal cord injury facts and figures at a glance. Available at: https://www.nscisc.uab.edu/Public/Facts%20and%20Figures%202019%20-%20Final.pdf. Accessed November 30, 2019.
2. Kirshblum S, Burns S, Biering-Sorensen F, et al. International standards for neurological classification of spinal cord injury. J Spinal Cord Med 2011;34:535-46.
3. Carpenter C, Forwell SJ, Jongbloed LE, Backman CL. Community participation after spinal cord injury. Arch Phys Med Rehabil 2007;88:427-33.
4. Schönherr M, Groothoff J, Mulder G, Eisma W. Participation and satisfaction after spinal cord injury: results of a vocational and leisure outcome study. Spinal Cord 2005;43:241.
5. Van Leeuwen C, Kraaijeveld S, Lindeman E, Post M. Associations between psychological factors and quality of life ratings in persons with spinal cord injury: a systematic review. Spinal Cord 2012;50:174.
6. Daniels MJ, Drogin Rodgers EB, Wiggins BP. "Travel Tales": an interpretive analysis of constraints and negotiations to pleasure travel as experienced by persons with physical disabilities. Tour Manag 2005;26:919-30.
7. Small J, Darcy S, Packer T. The embodied tourist experiences of people with vision impairment: management implications beyond the visual gaze. Tour Manag 2012;33:941-50.
8. Hammel J, Magasi S, Heinemann A, Whiteneck G, Bogner J, Rodriguez E. What does participation mean? An insider perspective from people with disabilities. Disabil Rehabil 2008;30:15.
9. Magasi SR, Heinemann AW, Whiteneck GG. Participation following traumatic spinal cord injury: an evidence-based review for research: report on the national institute on disability and rehabilitation research spinal cord injury measures meeting. J Spinal Cord Med 2008;31:145-56.
10. Noreau I, Fougeyrollas P. Long-term consequences of spinal cord injury on social participation: the occurrence of handicap situations. Disabil Rehabil 2000;22:11.
11. Heinemann AW, Lai JS, Wong A, et al. Using the ICF's environmental factors framework to develop an item bank measuring built and natural environmental features affecting persons with disabilities. Qual Life Res 2016;25:2775-86.
12. Magasi S, Wong A, Gray DB, et al. Theoretical foundations for the measurement of environmental factors and their impact on participation among people with disabilities. Arch Phys Med Rehabil 2015;96:569-77.
13. Stucki G, Reinhardt JD, Bickenbach J. Re: "Theoretical foundations for the measurement of environmental factors and their impact on participation among people with disabilities." Arch Phys Med Rehabil 2015;96:1739-40.
14. Heinemann AW, Miskovic A, Semik P, et al. Measuring environmental factors: unique and overlapping International Classification of Functioning, Disability and Health coverage of 5 instruments. Arch Phys Med Rehabil 2016;97:2113-22.
15. Reinhardt J, Post M. Measurement and evidence of environmental determinants of participation in spinal cord injury: a systematic review of the literature. Topics Spinal Cord Inj Rehabil 2010;15:26-48.
16. Noreau L, Boschen K. Intersection of participation and environmental factors: a complex interactive process. Arch Phys Med Rehabil 2010;91(9 Suppl):44-53.
17. Cole S, Svetina D, Whiteneck G. Developing a barriers scale in the context of travel: TRIP. Arch Phys Med Rehabil 2019;100:52-9.
18. Whiteneck G, Dijkers MP. Difficult to measure constructs: conceptual and methodological issues concerning participation and environmental factors. Arch Phys Med Rehabil 2009;90(11 Suppl):22-35.
19. Jellema S, van Hees S, Zajec J, van der Sande R, Nijhuis-van der Sanden MW, Steultjens EM. What environmental factors influence resumption of valued activities post stroke: a systematic review of qualitative and quantitative findings. Clin Rehabil 2017;31:936-47.
20. Loidl V, Oberhauser C, Ballert C, Coenen M, Cieza A, Sabariego C. Which environmental factors have the highest impact on the performance of people experiencing difficulties in capacity? Int J Environ Res Public Health 2016;13:416.
21. Wong AW, Ng S, Dashner J, et al. Relationships between environmental factors and participation in adults with traumatic brain injury, stroke, and spinal cord injury: a cross-sectional multi-center study. Qual Life Res 2017;26:2633-45.
22. Chang FH, Liu CH, Hung HP. An in-depth understanding of the impact of the environment on participation among people with spinal cord injury. Disabil Rehabil 2018;40:2192-9.
23. Goodman LA. Snowball sampling. Ann Math Stat 1961:148-70.
24. Glaser BG. The constant comparative method of qualitative analysis. Soc Probl 1965;12:436-45.
25. DeVellis RF. Scale development: theory and applications. Los Angeles: Sage Publications; 2016.
26. Andrich D. Application of a psychometric rating model to ordered categories which are scored with successive integers. Appl Psychol Meas 1978;2:581-94.
27. Rasch G. Probabilistic models for some intelligence and attainment tests. Copenhagen, Denmark: Danish Institute for Educational Research; 1960.
28. Masters GN. A Rasch model for partial credit scoring. Psychometrika 1982;47:149-74.
29. Barclay L, McDonald R, Lentin P. Social and community participation following spinal cord injury: a critical review. Int J Rehabil Res 2015;38:1-19.