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Research Article

Impact of spasticity on quality of life of Lebanese individuals with spinal cord injury: Validity and reliability of the Arabic modified patient-reported impact of spasticity measure

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Context: Spasticity is one of the most complicated problems after spinal cord injury (SCI). Different assessment tools are used to assess spasticity and its impact on individuals with SCI. The modified Patient-Reported Impact of Spasticity Measure (mPRISM) is a recommended tool to measure spasticity in spinal cord damage.
Objective: To translate and cross-culturally adapt mPRISM to Arabic and examine its validity and reliability in a sample of Lebanese adults with SCI.
Design: A cross-sectional study.
Participants: 107 individuals with SCI.
Outcome measures: mPRISM.
Intervention: mPRISM was translated into Arabic, and pilot testing of the pre-final version was conducted. Exploratory factor analysis, Poisson regression, and Cronbach's alpha were performed to evaluate the construct and convergent validity and reliability of the Arabic version of mPRISM (AR-mPRISM).
Results: mPRISM was successfully translated and cross-culturally adapted to Arabic. Results of an exploratory factor analysis conducted on the scale showed a coherent 5-domain structure that explained 69.631% of the total variance. Convergent validity was demonstrated by a significant association with sociodemographic and injury correlates. The five extracted subscales demonstrated high internal consistency with a Cronbach's alpha > 0.8.
Conclusion: Results support the construct and convergent validity and reliability of AR-mPRISM for assessing spasticity impact on the quality of life of Arabic Speaking SCI population.

Keywords: Spinal cord injuries, Muscle spasticity, Patient-reported outcome measures, Psychometrics

Introduction

Spasticity in persons with spinal cord injury (SCI) is commonly one of the most complicated sequelae (1). It is a sensorimotor disorder characterized by intermittent or sustained involuntary muscle activity. Spasticity is presented as disability affecting functionality and daily activities of individuals with SCI (2) such as mobility, transfers, sleep, and comfort (3, 4). Spasticity negatively impacts the quality of life (QOL) because it severely affects physical, psychological, and social health (5); however, its positive aspect assists with transfers or standing (6). Therefore, understanding t spasticity impact on the QOL of individuals with SCI is crucial for providing better treatments throughout the rehabilitation process (7).

Standardized assessment tools are fundamental to assess spasticity (8). Clinical measurement tools including Ashworth Scale and Modified Ashworth Scale are the mostly used ones (9). They are intended to quantify spasticity but don't clarify the entire experience and its

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impact on individuals with SCI QOL (10). The use of self-rating assessments alongside clinical measures is recommended to understand the spasticity impact from the person's perspective to make better clinical decisions (11). The literature tackled various self-report measures to evaluate spasticity impact such as the spasticity-related quality of life 6-dimensions instrument (SQOL-6D) (12), the spinal cord injury spasticity evaluation tool (SCI-SET) (13), and the patient-reported impact of spasticity measure (PRISM) (14).

PRISM is one of the most relevant tools for evaluating spasticity impact (10). It proved valid and reliable to evaluate spasticity positive and negative effects (14). Accordingly, it is a spasticity-specific patient-reported outcome measure in spinal cord damage (15). A modified version of PRISM (mPRISM) was recently established using rash analysis and demonstrated adequate psychometric properties (16). The two versions are addressed to English speakers. The PRISM has only been validated and translated into Serbian for people with Multiple Sclerosis (17), impeding its application in countries speaking other languages.

Therefore, there is no validated Arabic self-report measures of spasticity impact in Lebanon. So, it is imperative to establish an Arabic version of mPRISM among individuals with SCI to evaluate the spasticity impact on QOL and to promote better clinical decision making for implementing the required interventions. This study aims to translate and cross-culturally adapt the mPRISM into Arabic and to examine its validity and reliability in a sample of Lebanese individuals with SCI.

Methods

It is a two-phase research. Phase 1 consisted of the translation and cross-cultural adaptation of mPRISM into Arabic. Phase 2 involved the validation of the Arabic Modified PRISM (AR-mPRISM) with Lebanese with SCI.

Phase 1: translation procedure and cross-cultural adaptation of the mPRISM

Translation of the English mPRISM into Arabic was conducted as per translation theories and cultural adaptation of health measures (18, 19). The translation was executed by two native Arabic-speaking translators; one was a rehabilitation professional while the other was a translator with no knowledge of the questionnaire objectives nor clinical or medical background. Each provided an independent translation of the mPRISM. Translations were uneven, but it was agreed on a synthesized unified version. Back Translation of this version was done by a rehabilitation professional without examinig the original English mPRISM. A committee of translators – a Physical Medicine and Rehabilitation Physician, one Physical Therapist, one Occupational Therapist, and a Clinical Psychologist – reviewed all translations. Ambiguities including cultural differences, colloquialism, and terminology – were resolved before adopting a pre-final version.

A pilot testing of the pre-final version was done. 10 Individuals with SCI and 5 native Arabic speakers (qualified rehabilitation professionals working with people suffering from SCI) filled out the pre-final version. Participants were asked to fill out a questionnaire about the relevance, comprehensiveness, and comprehensibility of Arabic using 5 Likert scale questions. They were encouraged to make any suggestions concerning terminology.

Rehabilitation professionals judged all relevance and comprehensiveness questions as accurate with minor terminology-related recommendations. All Participants with SCI responded with precision to all questions and didn't report any relevance, comprehensibility, or comprehensiveness problems. Feedback on each question was discussed and necessary modifications were made. The pre-final version was adjusted based on the results of the pilot testing; minor modifications of terminology for items 2, 4, and 14 were done. Subsequently, the final Arabic version of mPRISM (AR-mPRISM) was generated and was validated.

Phase 2: validation procedure

Study design and participants

A cross-sectional study was conducted between March and May 2022. 18+ Lebanese individuals with SCI (traumatic or non-traumatic) above – who read, speak, and understand Arabic, and have experienced spasticity were invited to participate. Participants diagnosed with severe cognitive or psychological problems that might have influenced their responses to the questionnaire were excluded.

130 subjects from 5 rehabilitation centers, who met the inclusion criteria were enrolled by contacting rehabilitation professionals from different geographic areas in Lebanon (Beirut, South, Bekaa and Tripoli) and informing them on the inclusion and exclusion criteria. Eligible participants were informed of the study details and its purpose over a phone call and got their consent to participate. Then, the link of the questionnaire survey as well as an explanation of the purpose of the study, its procedure, and a clear electronic informed-consent document were sent via WhatsApp.

Instrument

Due to COVID-19 pandemic restricting face-to-face interviews, the questionnaire was developed using "Google Forms". The Arabic questionnaire was divided into two sections: sociodemographic and injury characteristics, and the final version of the AR-mPRISM.

The first section included sociodemographic information (age, sex, marital status, education, profession) and questions about the history of the spinal cord injury such as timing, causes, level (paraplegia, tetraplegia), and severity–the severity of injury was evaluated using six representative questions from the American Spinal Injury Association Impairment Scale classifications (AIS), allowing for the categorization of the severity of the injury as A "motor and sensory complete", "B" sensory incomplete, or C/D "motor incomplete". This classification approach was used in various published studies (4).

The second section included the AR-mPRISM–The mPRISM was deducted from the original patient-reported impact of spasticity measure (PRISM) initially developed by Cook *et al.* (10), after a Rash analysis to optimize its validity and efficiency (16). PRISM consisted of 41 items, grouped into 7 subscales; Social Avoidance/Anxiety, Psychological Agitation, Daily Activities, Need for Assistance/Positioning, Positive Impact, Needs for Intervention, and Social Embarrassment. The rating scale was formed following the perception of the frequency of experienced spasticity effects during the previous week, ranging from 0 as "never" to 4 as "very often". The reliability of PRISM for each subscale was evaluated and showed high Internal Consistency (Cronbach's alpha 0.74–0.96). The reproducibility of the scores was high (Intra Class Correlation Coefficient values range = 0.82 to 0.91). Its validity was evaluated by testing the relationship between its subscales and the responses given to questions relating to severity and interference; the reported levels of interferences and severity showed a statistically significant correlation with PRISM subscales. The scoring of PRISM is separate for each subscale, calculated by multiplying the average of items score by the number of items. Items of positive impact are scored and subtracted from the subtotal of negative impact subscales to provide the total PRISM score. The higher the score, the more negative impact of spasticity's reported (14).

The mPRISM consisted of 37 items, divided into 3 subscales–physical, psychological, social. Rating categories yielded a 3-point rating scale from "0 as never" to 2 as "Often to Very Often". mPRISM showed strong psychometric properties with high reliability (>0.80). Pearson correlation coefficients between the original and modified measure were statistically significant at $P < 0.01$. The authors suggested further studies using mPRISM in populations with SCI (16).

Ethical considerations

The Institutional Review Board of Health, Rehabilitation, Integration, and Research Center, Beirut-Lebanon approved the study. All collected information was gathered anonymously, without respondents, personal or contact details, insuring adequate confidentiality and safety of participants.

Statistical analysis

Data was generated on an excel spreadsheet and exported to statistical software IBM SPSS 26.0 for analysis. Responding to all the questions was mandatory; there was no missing data. Descriptive statistics were used to summarize means and standard deviations for continuous variables, frequencies and percentages for categorical variables.

Construct validity of the AR-mPRISM was evaluated using exploratory factor analysis with varimax rotation including principal components. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were implemented to confirm sampling adequacy and evaluate the relevance of performing factor analysis. The KMO index (0.5 score) was considered suitable for factor analysis. Factors with an eigenvalue greater than one were selected (20), with factor loadings and communalities > 0.5 considered representative within the scale (21). Convergent validity was estimated by testing the association between the different dimensions of AR-mPRISM and baseline characteristics using Poisson regression. Odds ratio was used to measure the association between each dimension and the different factors. Reliability of the AR-mPRISM was evaluated in terms of internal consistency using Cronbach's alpha for the total score and each subscale (coefficients above 0.7) reflected good internal consistency. All included statistical tests were two-sided with a level of 0.05 set as significant.

Results

Participants characteristics

107 individuals with SCI accepted to participate in the study. The majority were males (68.2%) with a mean age of 35.9 years. Most participants had traumatic SCI (70%) – 60.747% paraplegic, and 57% motor incomplete SCI (AIS C/D). Spasms were experienced

daily by all participants with 73.8% reporting 1–9 spasms/day. The average scores of the AR-mPRISM subscales and the total score are near the median, indicating relatively the range of the scale that most participants reported moderate levels of influence of spasticity on different dimensions. Detailed description of participants' baseline characteristics is shown in Table 1.

Construct validity-exploratory factor analysis

Factor analysis was performed over a sample of 107 participants and included the 37 items of the AR-mPRISM. KMO test result (KMO = 0.912) showed excellent sampling adequacy with a significant Bartlett's test of sphericity (*P*-value = 0.0001). This analysis extracted a 5-component model with eigenvalues > 1.0 accounting for 69.631% of the total variance. Eigenvalues: first factor = 10.110, second = 4.499, third = 4.163, fourth = 3.588, fifth = 3.403.

Communalities of the 37 items ranged from fair to high (0.582–0.858); factor loadings were adequately moderate to high (0.515–0.853) for all items. Factor1 "Psychosocial impact" included items 21–37 and explained 27.325% of the variance. Factor2 "Physical impact" constituted items "4, 8, 10, 11, 16, 17, 18, 20", accounting for 12.160% of the variance. Factor3 "social embarrassment subscale" contained item "12, 4, 19", reflecting 11.251% of the variance. Factor4 "Need for assistance in daily activities" contained item"1,2,5,6,9", representing 9.698% of the total variance. Factor5 encompassed items "3, 7, 13, 15", characterizing "positive impact" and accounting for 9.197% of the total variance. This reflects a coherent five-factor structure. The 37 items are representable within the scale where no item should be extracted. Description of KMO Test, Bartlett's Test of Sphericity, communalities and factor loadings are shown in Table 2.

Table 1 Baseline characteristics of the participants.

Socio-demographic characteristics of participants		
Age Mean ± SD (years)	35.9 ± 15.4	
Variable	Frequency	Percentage
Sex		
Male	73	68.2%
Female	34	31.8%
Marital Status		
Married	44	41.1%
Unmarried	63	58.9%
Educational Level		
Lower	69	64.5%
High	38	35.5%
Employment Status		
Employed	45	42.1%
Unemployed	62	57.9%
Injury related characteristics		
Cause of the injury		
Traumatic SCI	76	71%
Non-traumatic SCI	31	29%
Time since injury		
0–6 months	20	18.7%
6–12 months	16	15%
1–2 years	18	16.8%
2–10 years	34	31.8%
>10 years	19	17.8%
Level of injury		
Paraplegia	65	60.747%
Quadriplegia	42	39.252%
Severity of Injury/ AIS		
A Complete	35	32.7%
B Sensory Incomplete	11	10.3%
C/D Motor Incomplete	61	57%
Spasm Frequency Score		
1–5/day	38	35.5%
6–9/day	41	38.3%
10 or more spasms/day	28	26.2%
AR-mPRISM subscales scores		
Subscale	Range	Mean ± SD
AR-mPRISM Psychosocial impact	0–34	17.32 ± 11.417
AR-mPRISM Physical and functional impact	0–16	7.91 ± 4.844
AR-mPRISM Social Embarrassment	0–6	2.83 ± 2.103
AR-mPRISM Need for assistance in daily activities	0–10	5.25 ± 3.189
AR-mPRISM Positive impact (reverse scored)	0–8	3.53 ± 2.668
AR-mPRISM Total score	0–74	36.84 ± 21.092

Convergent validity

Since the AR-mPRISM doesn't have a cutoff, the total score of AR-mPRISM and its extracted subscales' scores were processed as continuous dependent variables in the Poisson regression model. Independent variables were: age range, sex, marital status, employment status, educational level, time since injury, cause of injury, level of injury, and AIS. Table 3 represents the associations between the aforementioned baseline characteristics and spasticity impact on different aspects (psychosocial, physical, social embarrassment, need for assistance, positive impact, and the total score).

Factors associated with psychosocial impact

The regression model showed significant correlation between the psychosocial impact and each of the following attributes: employment status, education, level of injury, AIS, and time since injury. Unemployed participants presented higher levels of psychosocial impact – 1.108 times (95% CI 0.999–1.229) more than those employed (Wald Chi-Square (W_T) = 3.785, *P*-value = 0.05). Highly educated participants demonstrated lower levels of psychosocial impact than the less educated (W_T= 32.929, *P*-value = 0.000). Risk of high psychosocial impact among participants with low

Table 2 Exploratory factor analysis of the AR-mPRISM.

Kaiser-Meyer-Olkin and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.912
Bartlett's Test of Sphericity	Approximate Chi-Square	3651.203
	Degree of freedom	666
	Significance	0.0001

Item		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communalities
1	Made grooming (hair, teeth) difficult for me or my attendant				0.537		0.684
2	Made me need someone to reposition me				0.701		0.702
3	Helped me keep my muscles exercised					0.744	0.653
4	Made me need more treatment than I could afford		0.599				0.595
5	Made dressing difficult for me or my attendant				0.708		0.783
6	Caused me to depend on others				0.733		0.711
7	Helped me stretch my muscles					0.793	0.717
8	Caused me to increase the amount of prescription medication I took		0.516				0.598
9	Made personal hygiene (e.g. toileting, cleaning) difficult for me or my attendant				0.523		0.712
10	Caused me to need safety devices (bed rails, foot loop)		0.672				0.742
11	Made eating or feeding difficult for me or my attendant		0.694				0.742
12	Caused strangers to notice me			0.519			0.734
13	Helped with transfers (e.g. from chair to bed)					0.787	0.692
14	Caused others to avoid touching me			0.560			0.613
15	Helped me or my attendant change my position					0.750	0.727
16	Drastically changed the position of my body		0.662				0.685
17	Made me fearful that I would cause myself physical injury		0.575				0.626
18	Made transfer hard for me or my attendant		0.515				0.582
19	Caused strangers to stare at me			0.588			.594
20	Made it hard to keep my arms or legs inside my chair		.557				0.663
21	Bothered me a lot	0.528					0.649
22	Caused me to feel hopeless	0.673					0.750
23	Made me feel out of control of my body	0.566					0.633
24	Kept me from being as happy as I could be	0.698					0.698
25	Made me feel frustrated	0.758					0.709
26	Made me feel powerless	0.694					0.732
27	Made me want encouragement or emotional support from friends and family	0.618					0.633
28	Put me in a bad mood	0.732					0.733
29	Made me feel depressed	0.786					.755
30	Interfered with my ability to exercise	0.562					0.623
31	Made me anxious about going out in public	0.668					0.730
32	Kept me from going out among strangers	0.833					0.809
33	Kept me from wanting to go out in public	0.760					0.771
34	Made me anxious about going out with friends	0.842					0.809
35	Caused me embarrassment	0.826					0.828
36	Caused me to avoid physical contact with other people	0.729					0.691
37	Kept me from going out with friends	0.863					0.858
Eigenvalue		10.110	4.499	4.163	3.588	3.403	
Percentage of explained variance		27.325%	12.160%	11.251%	9.698%	9.197%	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

Table 3 Association between baseline characteristics and the AR-mPRISM.

Dependent variable	Factors	Wald Chi-Square	*P*-value	OR (95% CI)
AR-mPRISM – Psychosocial impact subscale	Employment status			
	Unemployed	3.785	0.05	1.108 (0.999–1.229)
	Employed			Reference
	Educational level			
	Low	32.929	0.000	1.395 (1.245–1.563)
	High			Reference
	Level of injury			
	Paraplegia	41.014	0.000	0.731 (0.664–0.804)
	Tetraplegia			Reference
	AIS			
	A	12.875	0.000	1.209 (1.090–1.341)
	B	12.655	0.000	0.698 (0.572–0.851)
	C/D			Reference
	Time since injury			
	SCI < 2 years	197.304	0.000	2.179 (1.955–2.429)
	SCI > 2 years			Reference
AR-mPRISM – Physical impact subscale	Level of injury			
	Paraplegia	31.885	0.000	0.664 (0.576–0.765)
	Tetraplegia			Reference
	AIS			
	A	16.839	0.000	1.370 (1.179–1.592)
	B			
	C/D			Reference
	Time since injury			
	SCI < 2 years	37.135	0.000	1.637 (1.397–1.919)
	SCI > 2 years			Reference
AR-mPRISM – Social Embarrassment subscale	Level of injury			
	Paraplegia	20.016	0.000	0.579 (0.455–0.735)
	Tetraplegia			Reference
	Time since injury			
	SCI < 2 years	19.726	0.000	1.859 (1.414–2.445)
	SCI > 2 years			Reference
AR-mPRISM – Need for assistance subscale	Age			
	<35 years	5.139	0.023	0.786 (0.638–0.968)
	>35 years			Reference
	Employment status			
	Unemployed	5.6545	0.017	1.258 (1.041–1.521)
	Employed			Reference
	Educational level			
	Low	4.204	0.040	1.242 (1.010–1.529)
	High			Reference
	Cause of injury			
	Traumatic	10.035	0.002	1.397 (1.136–1.718)
	Non-traumatic			Reference
	Level of injury			
	Paraplegia	24.718	0.000	0.644 (0.542–0.766)
	Tetraplegia			Reference
	AIS			
	A	7.805	0.005	1.309 (1.084–1.582)
	B			
	C/D			Reference
	Time since injury			
	SCI < 2 years	32.569	0.000	1.778 (1.459–2.166)
	SCI > 2 years			Reference
AR-mPRISM – Positive impact subscale	AIS			
	A	9.233	0.002	1.415 (1.131–1.770)
	B			
	C/D			Reference
	Time since injury			
	SCI < 2 years	8.920	0.003	1.419 (1.128–1.785)
	SCI > 2 years			Reference

Continued

Table 3 Continued.

Dependent variable	Factors	Wald Chi-Square	*P*-value	OR (95% CI)
AR-mPRISM – Total score	Age			
	Age < 35	4.498	0.034	0.918 (0.849–0.994)
	Age > 35			Reference
	Sex			
	Male	4.934	0.026	0.921 (0.856–0.990)
	Female			Reference
	Employment Status			
	Unemployed	11.651	0.001	1.131 (1.054–1.215)
	Employed			Reference
	Educational level			
	Low	30.682	0.0001	1.244 (1.152–1.344)
	High			Reference
	Cause of injury			
	Traumatic SCI	11.203	0.001	1.139 (1.056–1.230)
	Non-Traumatic SCI			Reference
	Level of injury			
	Paraplegia	103.797	0.0001	0.710 (0.665–0.759)
	Tetraplegia			Reference
	AIS			
	A	46.906	0.0001	1.279 (1.192–1.373)
	B	4.942	0.026	0.867 (0.764–0.983)
	C/D	Reference		
	Time since injury			
	SCI < 2 years	281.820	0.0001	1.882 (1.748–2.026)
	SCI > 2 years			Reference

educational levels was 1.395 times (95% CI 1.245–1.563) more than those highly educated. Participants with paraplegia presented lower levels of psychosocial impact than those with tetraplegia (W_T= 41.014, *P*-value = 0.000). Participants with tetraplegia were more likely to experience high psychosocial impact – 0.731 times (95% CI 0.664–0.804) than those with paraplegia. AIS level A participants showed a higher risk of psychosocial impact (W_T= 12.875, *P*-value = 0.000) than level B or C/D – 1.209 times more (95% CI 1.090–1.341). Participants who've suffered from SCI > 2 years demonstrated lower levels of psychosocial impact 2.179 times (95% CI 1.955–2.429) than those who've endured it for less time (W_T= 197.304, *P*-value = 0.000).

Factors associated with physical impact

Spasticity physical impact seemed to be associated with the injury level, severity, and duration. Participants with tetraplegia showed a higher physical impact of 0.664 times (95% CI 0.576–0.765) than paraplegia (W_T= 31.885, *P*-value = 0.000). Participants with motor and sensory complete injury (AIS A) had physical impact levels of spasticity 1.370 times (95% CI 1.179–1.592) more than participants with less severe injuries (W_T= 16.839, *P*-value = 0.000). The physical impact in participants who'd endured the injury < two years was 1.859 times (95% CI 1.414–2.445) higher than in participants who have suffered from SCI > two years.

Factors associated with social embarrassment

Participants with tetraplegia showed levels of social embarrassment – 0.579 times (95% CI 0.455 - 0.735) higher than participants with paraplegia. Participants with SCI < 2 years had social embarrassment levels – 1.859 times (95% CI 1.414–2.445) more than those with chronic SCI.

Factors associated with the need for assistance in daily activities

The regression model showed significant correlation between the need for assistance due to spasticity and age (W_T= 5.139, *P*-value = 0.023), employment status (W_T= 5.6545, *P*-value = 0.017), educational level (W_T= 4.204, *P*-value = 0.040), cause of injury (W_T= 10.035, *P*-value = 0.002), level of injury (W_T= 24.718, *P*-value = 0.000), AIS (W_T= 7.805, *P*-value = 0.005), and time since injury (W_T= 32.569, *P*-value = 0.000). Higher need for assistance was found in participants > 35 years, unemployed, had low educational levels, suffered from a traumatic type of SCI (rather than non-traumatic), were with tetraplegia, suffered from AIS A, and had dealt with SCI for < two years.

Factors associated with positive impact

Positive impact of spasticity appeared to be significantly associated with the duration (W_T = 8.920, *P*-value = 0.003) and the severity of SCI (WT = 9.233, *P*-value = 0.002). Participants with complete injury (AIS A) perceived a more positive impact of spasticity – 1.415 times (95% CI 1.131–1.770) more than those with AIS B or C/D. Participants with SCI for < two years also experienced a positive impact of spasticity – 1.419 times (95% CI 1.128–1.785) more than those with SCI > two years.

Factors associated with total AR-mPRISM

In the regression model, total scores of AR-mPRISM were significantly associated with age (*P*-value = 0.034, OR = 0.918 (95% CI 0.849–0.994)), sex (*P*-value = 0.026, OR = 0.921 (95% CI 0.856–0.990)), employment status (*P*-value = 0.001, OR = 1.131 (95% CI 1.054–1.215)), educational level (*P*-value = 0.0001, OR = 1.244 (95% CI 1.152–1.344)), injury cause (*P*-value = 0.001, OR = 1.139 (95% CI 1.056–1.230)), injury level (*P*-value = 0.0001, OR = 0.710 (95% CI 0.665–0.759)), AIS (*P*-value = 0.0001, OR = 1.279 (95% CI 1.192–1.373)), and time since injury (*P*-value = 0.0001, OR = 1.882 (95% CI 1.748–2.026)).

Reliability analysis

Table 4 demonstrates the reliability analysis of AR-mPRISM subscales. The items of AR-mPRISM subscales have excellent internal consistency with an Alpha coefficient of 0.970, 0.894, 0.851, 0.881 and 0.832 for the first, second, third, fourth and fifth factors, respectively. Cronbach's Alpha of the whole scale demonstrated high internal consistency ($\alpha = 0.972$).

Discussion

This study presents the first report on the translation and cultural adaptation of the mPRISM to another language. It reveals a reliable and valid Arabic version of mPRISM as an instrument for evaluating spasticity impact on the QOL of Lebanese with SCI.

The obtained Arabic mPRISM was clear and understandable with no comprehensibility difficulties in the translated items. Its psychometric properties go along with the original English measure (14, 16). In terms of content validity, AR-mPRISM was considered very rational after conducting minor modifications based on experts' recommendations. Regarding construct validity, factor analysis extracted five factors; these represented different items distributed into different aspects that weren't compatible strictly with the English mPRISM aspects (16). The first factor of AR-mPRISM was labeled "Psychosocial Impact" as it represented 17 items targeting the impact on psychological and social activities, corresponding with the combination of psychological and social subscale items in the original mPRISM (16). The second factor included 8 items from the original mPRISM Physical subscale representing the physical aspects of different dimensions, so it is a "Physical Impact subscale". The third factor consisted of items 12, 14, and 19, which originated from the physical subscale in mPRISM. Inconsistency was resolved by considering these items in a separate dimension "social embarrassment", which is compatible with the original PRISM Social embarrassment subscale (14). The fourth factor included 5 items from the physical subscale of the English mPRISM; these addressed the need for assistance in daily activities. The Daily Activities and Need for Assistance subscales of the original PRISM identified them and justified the modifications done for AR-mPRISM (14). The fifth factor included items "3, 7, 13, and 15" from the physical subscale in the mPRISM. These items reflect spasticity positive impact, portrayed as a separate dimension of "positive impact". Results are consistent with the original PRISM results that were characterized as the Positive Impact Subscale (14).

The difference between our population sample and participants targeted in the original mPRISM (n = 1080), and the variance in the socio-demographic and clinical variables of the two studied populations justify this discrepancy (16). Therefore, our results support the ones of the developmental work of the original PRISM composed of 7 subscales (14).

Evidence of convergent validity of AR-mPRISM was supported by its association with several demographic and injury correlates confirming prior research findings (4, 23). Participants with SCI from > two years have less AR-mPRISM scores than participants with less duration, justified by the modification in spasticity

Table 4 Reliability analysis of the AR-mPRISM subscales.

Factor	N of Items	Cronbach's alpha
AR-mPRISM Psycho-social impact	17	0.970
AR-mPRISM Physical and functional impact	8	0.894
AR-mPRISM Social Embarrassment	3	0.851
AR-mPRISM Need for assistance in daily activities	5	0.881
AR-mPRISM Positive impact	4	0.832
AR-mPRISM Total score	37	0.972

experience after a long time from injury in comparison with the first few years; perceived spasticity and its impact are mediated by injury duration and a significant reduction of problematic spasticity was demonstrated between 1–2 years after SCI as confirmed in previous studies (24–26). This study results replicated the greater negative impact on daily activities and need for assistance found in individuals with tetraplegia more than in paraplegia; this can be justified by the fact that individuals with arm function impairments suffer from the high effect of spasticity and require more assistance than those with normal arm control (23). Likewise, in past studies, the association of AIS with spasticity impact is consistent with the increase in AIS motor score that can predict experiencing problematic spasticity (27).

The reliability of AR-mPRISM was verified by good to excellent IC of the 5 factors ($\alpha = 0.832$–0.90). The psychosocial subscale's IC was similar to the psychological and social subscales IC of mPRISM ($\alpha > 0.90$) (16). IC of all subscales was similar and higher than those reported for PRISM with α of the physical subscale > 0.80, $\alpha = 0.851$ for social embarrassment compatible with $\alpha = 0.86$ of PRISM social embarrassment, need for assistance in daily activities ($\alpha = 0.881 > \alpha = 0.76$ and 0.87 for the need for assistance and daily Activities subscales of PRISM) (14). The IC of the positive impact subscale is demonstrated as good ($\alpha = 0.832$) and higher than those of PRISM ($\alpha = 0.76$) (14). The resulting distinction can be argued by the importance of discriminating the social embarrassment and positive impact, which are a descriptor of spasticity impact in a unique way similar to that reported in a previous study (17).

Spasticity experience in individuals with SCI has affected QOL of Lebanese with SCI which is compatible with various studies (22, 28). Knowing that there's a lack of Arabic instruments; the acquisition of such tools in Lebanon relies on various recommendations for improving assessment methods and clinical outcomes after interventions (10). To the best of our knowledge, this is the first cross-sectional study conducted on the Lebanese SCI population to provide a new Arabic measure for spasticity impact on different QOL dimensions, which represents an essential contribution for rehabilitation professionals in the assessment and management of individuals with SCI in all Arabic Speaking countries. Accordingly, different deductions were demonstrated concerning the spasticity experience in individuals with SCI, confirming reports on spasticity as context-dependent and multidimensional (2). As for limitations, data was gathered through a self-reported online survey without any clinical data, so the responses can be affected by personal/social factors. Test-retest reliability wasn't evaluated since data collection was anonymous through the online survey. Convergent validity was not performed by correlating the scale with the gold standard measure since there are no validated Arabic spasticity measures. This is the first study addressing mPRISM recently published, meaning lack of literature to support our findings. However, further studies should be conducted to explore the test-retest reliability of scale, in addition to developing and ensuring validity and reliability findings of this measure in different Arab countries.

Conclusion

The final findings provide a valuable tool to address spasticity impact on different dimensions of QOL among Lebanese individuals with SCI. The translation and minor cultural adaptation confirm that mPRISM can be applied to other languages. Based on the adequate validity and reliability results, AR-mPRISM established good psychometric properties. This study emphasizes the value of investigating spasticity impact on QOL with its various aspects as well as its influencing sociodemographic and clinical factors to direct rehabilitation care. Future broad investigations are needed to reveal the importance of objective and subjective psychometric instruments in assessing spasticity in SCI and the QOL-related rehabilitation outcomes.

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