Spanish Version of the Whiplash Disability Questionnaire in Adults With Acute Whiplash-Associated Disorders

Andrés Barriga-Martín, MD, PhD,[a] Esperanza Holgado-Moreno, MD,[b] Gerardo Ávila-Martín, PhD,[c] Iriana Galán-Arriero, PhD,[c] Luis M. Romero-Muñoz, MD, PhD,[a] Antonio Segura-Fragoso, MD,[d] Julio Gómez-Soriano, PT, PhD,[e] Julian Taylor, PhD,[c] and Diego Serrano-Muñoz, PT, PhD[c]

Abstract

Objective: The purpose of this study was to develop and validate a Spanish version of the Whiplash Disability Questionnaire (WDQ) for the Spanish population with acute whiplash-associated disorder (WAD).

Methods: This was a cross-sectional questionnaire validation study. Adults with acute WAD (grade I to III) were enrolled within 3 weeks of their injury. A blinded forward and back translation of the WDQ was made from English to Spanish, and the resulting back-translation version was compared with the original. Patients with WAD completed the Spanish version of the 13-item WDQ. The developed questionnaire was assessed using psychometric statistical analysis including correlation with the numerical rating score for pain, Northwick Park Neck Pain Questionnaire, Neck Disability Index, and 36-item Short Form Health Survey.

Results: Fifty-six patients completed the questionnaire, the mean age was 33.9 years (standard deviation [SD] = 10.5), and 76.8% were women. Participants were enrolled 13.9 days (SD 4.9) after the injury, with 14.3% presenting with WAD grade I and 85.7% with WAD grade II. The mean WDQ score was 62 (SD = 31). Two factors were detected, and the factor structure remained stable after translation. Positive correlations were identified between the total WDQ score and the numerical rating score, Neck Pain Questionnaire, and Neck Disability Index results, with a strong negative correlation with the 36-item Short Form Health Survey.

Conclusion: The Spanish version of WDQ is psychometrically reliable and a valid instrument to measure the disability status in patients with acute WAD within the clinic. (J Manipulative Physiol Ther 2019;42:276-283)

Key Indexing Terms: *Whiplash Injuries; Disability Evaluation; Patient Outcome Assessment*

Introduction

Whiplash-associated disorder (WAD) is the term used for the different clinical signs and symptoms that people present when they experience a whiplash injury, which is produced after sudden acceleration–deceleration of the neck.[1] Whiplash injury most often is caused by rear-end motor vehicle accidents, but also may occur after other types of collisions, slips, and falls.[1] Nearly 50% of patients with whiplash will never fully recovery from the injury, and approximately 25% to 50% will develop chronic pain with complex clinical signs of poor functional recovery.[1-4] The most common symptom is neck pain, but other symptoms such as headache, dizziness, arm pain, problems with concentration, and depression may also be present.[5,6]

Although WAD presents a major medical problem[7] and its cost can exceed up to £3 billion per year in the United Kingdom or $230 billion in the United States,[8] there are only a few WAD-specific measures with sound psychometric properties. Several disability measures are

[a] Pathology of the Spine Research Group, Department of Orthopaedic Surgery and Traumatology. Hospital Nacional de Parapléjicos, Toledo, Spain.
[b] Department of Orthopaedic Surgery and Traumatology, Hospital Virgen de la Salud, Toledo, Spain.
[c] Sensorimotor Function Group, Hospital Nacional de Parapléjicos, Toledo, Spain.
[d] Health Sciences Institute, Talavera de la Reina, Toledo, Spain.
[e] Toledo Physiotherapy Research Group (GIFTO), Nursing and Physiotherapy School, Universidad de Castilla La Mancha, Toledo, Spain.
Corresponding author: Diego Serrano-Muñoz, PT, PhD, Sensorimotor Function Group, Hospital Nacional de Parapléjicos, Toledo 45071, Spain. Tel.: +0034 925244700 ext 783.
(e-mail: *dserranomu@externas.sescam.jccm.es*).
Paper submitted February 19, 2018; in revised form April 26, 2018; accepted November 2, 2018.
0161-4754

https://doi.org/10.1016/j.jmpt.2018.11.013

commonly used to assess WAD, such as the Neck Disability Index and the Neck Bournemouth Questionnaire, but these tools focus on 1 aspect of disability in WAD, namely neck pain and its implication for physical activity.[9]

The Whiplash Disability Questionnaire (WDQ) is a self-report questionnaire based on the International Classification of Functioning framework for disability and includes items from the Neck Disability Index such as pain intensity, personal care, and work. The WDQ also includes domains that detect important health and psychosocial domain items related to fatigue, sports injuries, depression, social activities, and anger[5,10,11] that generally include impairment, activity limitation, and participant restriction. Each item is scored from 0 (no impact) to 10 (greatest impact) on a numerical ordinal scale. The responses are summed from 0 (no disability) to 130 (complete disability).[9] The WDQ was developed in adults with chronic WAD, and its measurement properties have been reported to have excellent test–retest reliability. Recently, Stupar et al[9] demonstrated that the WDQ has the strongest construct validity in individuals with acute WAD. However, a version of the WDQ for the Spanish population is not currently available. The purpose of this study was to develop a Spanish version of the WDQ for Spanish population following forward and back translation from English for acute WAD and to validate this translated tool using standard psychometric analysis.

Methods

Participants and Procedures

Fifty-six patients with acute whiplash were recruited by 3 orthopedic surgeons at the National Hospital for Paraplegics and Virgen de la Salud Hospital in Toledo. The period of recruitment was between November 2016 and July 2017. The inclusion criteria included age between 18 and 65 years and an acute whiplash grade WAD of between I and III[12] assessed within 3 weeks of injury. Participants were required to be able to read and understand the Spanish language. Exclusion criteria included infection or tumor, migraine, chronic headache, or cervical spine surgery. The study was approved by the local clinical ethical committee of the Toledo Hospital Complex (no 92; 25/09/2015), and all participants were required to sign the informed consent. The methods used for the adaptation of the English version of the WDQ to Spanish and the evaluation of its psychometric properties were based on the quality criteria required to assess health questionnaires.[13,14]

Content Validity and Translation of the WDQ

The original WDQ was translated by 2 Spanish native health professionals. Each one performed an independent translation of all items, and all the translated items were then obtained and collated into a consensus version (Appendix 1). This version was back-translated to English by 2 native bilinguals (Spanish and English) to verify the semantic equivalence between the 2 versions.[15,16]

Questionnaire validity was assessed by 6 health professionals (4 rehabilitation physicians and 2 physiotherapists). All of these clinicians were instructed to assess the validity of the translated questionnaire to assess pain and quality-of-life issues related to whiplash by grading their responses as "yes," "no," or "not clearly" for each item.[16] Three rehabilitation physicians and 2 physiotherapists answered "not clearly" to the sixth item, and 3 rehabilitation physicians answered "not clearly" to the fourth item, and then they were modified.

Structural Validity and Internal Consistency

A factorial analysis with the objective of identifying the main domains or conceptual areas of the translated WDQ was performed. The pertinence of the factorial analysis was estimated with the Kaiser-Meyer-Olkin test with accepted values greater than 0.5 that indicated sampling adequacy and proof of Bartlett sphericity. We evaluated questionnaire structure by using an exploratory factorial analysis with varimax rotation, with the extraction of the main components using the Kaiser rule (eigenvalues >1) to determine the number of factors. The numerical for each item was based on an ordinal scale of 11 points (0 to 10), where the higher values indicated worse disability.

The test of internal consistency indicated that each questionnaire item measured the same concept. The Cronbach α coefficient was calculated for each main questionnaire item component that was identified in the factorial analysis. The Cronbach α was also calculated for the general questionnaire. A Cronbach α of 0.7 to 0.95 was accepted as a measure of good internal consistency.

Construct Validity

Construct validity refers to the degree to which the scores of the questionnaire are related to other questionnaire measures, with the theoretical hypothesis rived from the concepts that are used to measure it. This was performed for the Spanish version of the WDQ by correlating the WDQ with pain intensity (Numerical Rating Scale [NRS][17,18]), disability measures (Northwick Park Neck Pain Questionnaire [NPQ][19] and Neck Disability Index [NDI][20]), and general health (36-Item Short Form Health Survey [SF-36][15]). The hypothesis was that the WDQ would correlate strongly with the NRS, NPQ, and NDI, and negatively with the SF-36. We carried out Spearman correlations, where a ρ value of >0.7 was accepted as good.

Whiplash Disability Questionnaire

The WDQ consists of 13 items that measure the effect of the whiplash injury on pain, personal care, work duties, driving or public transportation, sleep, tiredness or fatigue,

social activity, sporting activity, nonsporting leisure activity, depression or sadness, anxiety, anger, and concentration.[10] Each item is scored from 0 (no impact) to 10 (greatest impact) on a numerical ordinal scale. The responses are summed from 0 (no disability) to 130 (complete disability).[9] The percentage score can also be calculated from 0 (no disability) to 100 (complete disability). Missing item values are considered 0 scores when the total WDQ score is calculated.[5]

Questionnaires for Neck Pain, Disability, and Quality of Life

Northwick Park Neck Pain Questionnaire. The NPQ is a self-administered questionnaire that includes 9 sections on daily activities that may be affected by neck pain: intensity, sleeping, numbness, duration, carrying, reading or television, work, social, and driving. Each item is scored on a 0-4 scale, where 4 represents the greatest disability; the total score is obtained by summing the scores of each item (0-36). The study of Gonzalez et al[21] showed that the Spanish version of the NPQ is a feasible, reliable, and valid instrument, which can be used to assess neck pain in clinical practice.

Neck Disability Index. The NDI is a self-report questionnaire with 10 sections[11]: pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleep, and recreation. The NDI is a modification of the Oswestry Low Back Pain Disability Index.[16] Each section has 6 possible response options describing the severity of pain-related disability (0 = no disability to 5 = maximal disability). The items are summed to a maximum total of 50 points. The total score can be used as a measure of disability based on the originally proposed scale (0-4, no disability; 5-14, mild disability; 15-24, moderate disability; 25-34, severe disability; >35, complete disability).[9] Andrade-Ortega et al[20] showed that the Spanish version of the NDI is reliable, valid, and sensitive to change.

Numerical Rating Scale. The NRS consists of a scale from 0 (no pain) to 10 (worst possible pain), which has been validated and is a reliable measure to assess pain intensity.[17,18] It has good quality in patients with acute pain and has better reliability than the visual analog scale used in patients with trauma.[9]

36-Item Short Form Health Survey. The SF-36 is a general questionnaire that provides a profile of the health status and is applicable to both patients and the general population. It consists of 36 items that assess both the positive and negative states of health. The 36 items include 8 domains: general health, physical functioning, social functioning, role physical, role emotional, mental health, vitality, and bodily pain, where a higher score represents a better health status.[15] The Spanish version has been validated and has strong psychometric properties when applied to participants with musculoskeletal and degenerative neck conditions.[9,15] The instructions outlined by Stupar et al[9] were used to assess the physical (physical functioning and role) and emotional (emotional and mental health) domains.

Table 1. *Baseline Demographic Characteristics of Patients With Acute WAD (N = 56)*

Characteristic	Baseline
Sex	
Male, n (%)	13 (23.2)
Female, n (%)	43 (76.8)
Age, y	
Mean (SD)	33.9 (10.5)
Time since injury, d	
Mean (SD)	13.9 (4.9)
WAD	
I, n (%)	8 (14.3)
II, n (%)	48 (85.7)
III, n (%)	0 (0)
WDQ total score (0-130)	
Mean (SD)	62 (31)
Numerical Rating Score (neck pain 0-10)	
Mean (SD)	5.6 (2.3)
Neck Disability Index (0-50)	
Mean (SD)	17 (10)
Northwick Neck Pain Questionnaire (0-36)	
Mean (SD)	14 (7)
SF-36 Health Survey	
Mean (SD)	72 (12)
Highest level of education, N (%)	
Primary school	10 (17.9)
High school	27 (48.2)
University & further education	19 (33.9)

SD, standard deviation; *WAD*, whiplash-associated disorder; *WDQ*, Whiplash Disability Questionnaire.

Floor and Ceiling Effect

The floor and ceiling effect refers to the percentage of participants that used the highest or lowest possible scores.

Table 2. *Factorial Analysis Results*

Item	Variable	Factor Loading	% Missing	Statistics
Component 1				
WDQ1	Pain	0.71	0	Eigenvalue: 5.6 Cronbach α: 0.94 Explained variance After rotation, %: 43.2
WDQ2	Personal care	0.80	0	
WDQ3	Work/home/study duties	0.84	0	
WDQ4	Driving/using public transport	0.78	0	
WDQ5	Sleep	0.80	0	
WDQ6	Fatigue/tiredness	0.65	0	
WDQ7	Social activities	0.82	0	
WDQ8	Sporting activities	0.76	16	
WDQ9	Nonsporting leisure activities	0.79	7	
Component 2				
WDQ10	Depression/sadness	0.75	0	Eigenvalue: 3.2 Cronbach α: 0.8 Explained variance After rotation, %: 24.8
WDQ11	Anger	0.71	0	
WDQ12	Anxiety	0.90	0	
WDQ13	Concentration	0.69	0	

Total explained variance after rotation, %: 68.0. Total Cronbach α: 0.93.
WDQ, Whiplash Disability Questionnaire.

The percentage of highest and lowest possible scores for the total WDQ was performed with the 2 dimensions. If more than 15% of the respondents used minimum or maximum scores, floor and ceiling effects were assumed to be present. These effects reduce the reliability of the measure because participants with extreme scores are not able to be distinguished from each other.

Interpretability

This is defined as the degree to which a qualitative meaning can be assigned to the quantitative scores. Participants were compared regarding their total WDQ score according to sex, age, injury time, WAD, and NRS using the Mann-Whitney U test.

Data Analysis

Statistical procedures were performed using IBM SPSS software for Windows, version 23.0 (IBM Corp, Armonk, New York). Significance was considered with P values <.05 (bilateral). Demographic characteristics of the patients were analyzed using simple descriptive statistics.

Results

Participant Demographics

Table 1 shows the characteristics of 56 patients enrolled to adapt the English version of the WDQ to the Spanish population. Predominantly women reported WAD (76.8%), and in general the mean age of all participants with this pathology was 33.9 (SD 10.5) years. On average, participants were recruited 13.9 (SD 4.9) days after the automobile accident. Eight (14.3%) patients presented a WAD grade I, 48 (85.7%) patients were WAD grade II, and nobody was diagnosed with WAD grade III. The mean WDQ score was 62 (SD 31) of a total score of 130.

Factorial Analysis and Internal Consistency

Table 2 shows the results of factorial analysis, with the 2 identified factors, the factor loading value for each item, percentage of missing values, eigenvalues, Cronbach α score, and explained variance after rotation. All items for each factor showed a rotated factor loading of >0.4. All factors had an eigenvalue higher than 1, and the overall Cronbach α value was 0.93. The total percentage of variance explained after the rotation was 68%.

Table 3. *Correlation Between Spanish Version of WDQ Scores and NRS, NPQ, NDI, and SF-36*

Spearman's Correlations	NRS	NPQ	NDI	SF-36
WDQ total				
ρ	0.53	0.77	0.85	-0.70
P	<.001	<.001	<.001	<.001
n	56	56	56	56

NDI, Neck Disability Index; *NPQ*, Northwick Park Neck Pain Questionnaire; *NRS*, Numerical Rating Score; *SF-36*: 36-item Short Form Health Survey; *WDQ*, Whiplash Disability Questionnaire.

Table 4. *Floor and Ceiling Effect: Percentage of Values at the Minimum and Maximum Scores*

Factor	n	Mean	SD	Median	Min	Max	N (min)	N (max)	% (min)	% (max)
Total score WDQ	56	62	31	68	1	122	0	0	0	0
WDQ component 1	47	46	25	48	1	86	0	0	0	0
WDQ component 2	56	17	11	16	0	40	5	0	8.93	0

Min, minimum; *Max*, maximum; *SD*, standard deviation; *WDQ*, Whiplash Disability Questionnaire.

Table 5. *Mean Scores of the Spanish Version of the WDQ According to Clinical Characteristics of Patients With WAD*

	WDQ						
Characteristic	N	Mean	SD	95% CI	D Cohen	95% CI D Cohen	*P*
Age							
<34 years	29	62.1	30.1	(51.1-73.0)	0.003	(-0.52 to 0.53)	.79
35 to 67 years	27	62.1	32.1	(50.0-74.3)			
Sex							
Female	43	65.0	30.4	(55.9-74.1)	0.41	(-0.21 to 1.03)	.14
Male	13	52.5	31.5	(35.3-69.6)			
Evolution							
<14 days	28	65.1	30.7	(53.8-76.5)	0.20	(-0.33 to 0.72)	.427
14 to 21 days	28	59.1	31.2	(47.5-70.6)			
WAD							
I	8	15.6	19.4	(2.16-29.1)	2.24	(1.38-3.01)	<.001
II	48	69.8	25.0	(62.8-76.9)			
NRS							
0 to 5	24	45.3	30.3	(33.2-57.5)	1.08	(0.51-1.64)	.001
6 to 10	32	74.7	25.0	(66.0-83.3)			

CI, confidence interval; *NRS*, Numerical Rating Score; *SD*, standard deviation; *WAD*, whiplash-associated disorders; *WDQ*, Whiplash Disability Questionnaire.

Construct Validity

Table 3 shows the Spearman correlations between the scores of WDQ (both total score and their 2 factors) and the NRS, NPQ, NDI, and SF-36. Positive strong correlations were found with the NRS ($\rho = 0.53$; $P < .001$), NPQ ($\rho = 0.77$; $P < .001$), and NDI ($\rho = 0.85$; $P < .001$), and a strong negative correlation was identified with the SF-36 ($\rho = 0.70$; $P < .001$).

Floor and Ceiling Effect

Table 4 shows the maximum and minimum scores of the WDQ and its 2 factors, together with the percentage of participants scoring maximum and minimum values. All the percentages were well below 15% (8.93% for the second component).

Interpretability

Table 5 shows the mean scores of the WDQ regarding sex, age, evolution time, WAD, and NRS. There are very important differences in the WAD (Cohen's D = 2.24; $P < .001$) and NRS score (Cohen's D = 1.08; $P = .001$). A Cohen's D >0.8 is considered a large difference.

Discussion

Validation of the Spanish version of the WDQ for people with acute WAD demonstrates good reliability and psychometric properties for assessment of disability in clinical practice. Excellent internal consistency with values above 0.7 were identified and a Cronbach α of 0.93, which exceeds the minimal value required for clinical application of 0.9 and which is similar to the original value of 0.96 for the English version of the WDQ and greater than the value for the German version of 0.89 (Table 2).[10,16,22,23]

As expected, good construct validity for the Spanish version of the WDQ was identified. Positive strong correlations were found between the total WDQ score and the neck pain and disability scores obtained with the NRS, NPQ, and NDI (Table 3). A negative strong correlation was also obtained with the quality-of-life questionnaire, the SF-36 (Table 3). Pain and physical function are often considered the most salient features of WAD,[9] and as such, strong correlations were identified with the NRS and pain questionnaires, and a negative strong correlation was identified with the SF-36. The results are also in consonance with Stupar et al with strong correlation with the NDI, which reflects the development of the WDQ using original NDI items.[11] Floor and ceiling effects of the Spanish WDQ version do not appear to be a concern, and the interpretability is supported by the large range of scores obtained with the WAD and NRS (Tables 4 and 5).

Self-administered questionnaires are increasingly used as convenient and reproducible measures of subjective symptomatology in the field of pain.[21] The WDQ is a simple tool that evaluates the degree of disability that people with WAD experience. This test was developed for participants with chronic WAD by Pinfold et al[10] and demonstrates excellent content, construct validity, and internal consistency.[24] Stupar et al[9] determined the structural validity of the WDQ in individuals with acute WAD, and they showed strong construct validity, indicating that the WDQ is valid for use with patients in the clinical and research setting to determine disability status. Although the WDQ was developed for the English-speaking population, this tool is widely used in different countries in other languages, such as German.[23] Instructions for the adaptation of the English version of the WDQ was followed according to Guillemin et al.[14] All items were translated into Spanish without difficulty.

Limitations

One limitation of this study was the small sample size; despite it, our results are in consonance with the previous hypothesis. Another limitation was the time taken for participant recruitment, although the mean time of acute WAD was 13.9 ± 4.9 days, which may reflect a delayed time to develop comprehensive WAD symptoms. Other studies that have characterized acute WAD assessed this pathology at 5.7 ± 4.4 days,[5] 5.7 ± 4.7 days,[25] and 6.5 ± 4.9 days.[9] The present study did not assess test–retest reliability or the minimal detectable change, which are key metrics to develop and validate questionnaires in the clinical environment. In addition, the results of this study cannot be extrapolated to other Spanish-speaking populations owing to evident cultural differences between countries. Future studies are required to assess the test–retest reliability of the questionnaire and to establish the minimum detectable change.

Conclusion

The adaptation of the English version of the WDQ to the Spanish version shows significant psychometric properties, with high internal consistency, a high proportion of explained variance, good construct validity, minimal floor and ceiling effects, and good interpretability to discriminate categories of WAD and pain intensity levels. The Spanish version of the WDQ is valid and appropriate for use in the Spanish population.

Funding Sources and Conflicts of Interest

This study was funded by Mutua Madrileña-Adelas Foundation 2015. No conflicts of interest were reported for this study.

Contributorship Information

Concept development (provided idea for the research): A.B.-M., G.A.-M., I.G.-A., J.G.-S., J.T., D.S.-M.
Design (planned the methods to generate the results): A.B.-M., E.H.-M., L.M.R.-M., A.S.-G., J.G.-S., J.T., D.S.-M.
Supervision (provided oversight, responsible for organization and implementation, writing of the

manuscript): A.B.-M., G.A.-M., I.G.-A., L.M.R.-M., J.G.-S., J.T.
Data collection/processing (responsible for experiments, patient management, organization, or reporting data): A.B.-M., E.H.-M., L.M.R.-M., A.S.-F., D.S.-M.
Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): A.S.-F., J.G.-S., J.T., D.S.-M.
Literature search (performed the literature search): A.B.-M., G.A.-M., I.G.-A., L.M.R.-M., J.T., D.S.-M.
Writing (responsible for writing a substantive part of the manuscript): A.B.-M., E.H.-M., G.A.-M., I.G.-A., D.S.-M.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): A.B.-M., L.M.R.-M., J.G.-S., J.T.

Appendix 1. Spanish version of the Whiplash Disability Questionnaire following forward and backward translation

Apéndice 1. Cuestionario de Discapacidadtras Latigazo Cervical

Este cuestionario ha sido diseñado para aportar información sobre el impacto que tienen los síntomas del latigazo cervical ensuestilo de vida. Por favor haga un círculo en cada sección para indicarcómo de afectado se encuentra por el latigazo cervical y sus síntomas. Si una o máscuestiones no son relevantes para usted (por ejemplo, no participa en actividades deportivas), por favor déjela en blanco.

1. ¿Cuánto **dolor** tiene hoy?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de llevarlo a cabo

2. ¿Interfieren sus síntomas del latigazo cervical en su **cuidado personal** (asearse, vestirse, etc.)?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de llevarlo a cabo

3. ¿Interfieren sus síntomas del latigazo cervical en sus a **actividades laborales, domésticas, o de estudio**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de llevarlo a cabo

4. ¿Interfieren sus síntomas del latigazo cervical en la **conducción o uso de transporte público**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de conducir/usar trasporte público

5. ¿Interfieren sus síntomas del latigazo cervical en el **sueño**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de dormir

6. ¿Se siente más **cansado/fatigado** que antes de su lesión?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Siempre

7. ¿Interfieren sus síntomas del latigazo cervical en su **actividad social**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de socializarme

8. ¿Interfieren sus síntomas del latigazo cervical en su **actividad deportiva**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de participar

9. ¿Interfieren sus síntomas del latigazo cervical en sus **actividades de ocio no deportivas**?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de participar

10. ¿Ha experimentado **tristeza/depresión** cómo resultado de los síntomas de su latigazo cervical?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Siempre

11. ¿Ha experimentado **enfado** cómo resultado de los síntomas de su latigazo cervical?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Siempre

12. ¿Ha experimentado **ansiedad** cómo resultado de los síntomas de su latigazo cervical?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Siempre

13. ¿Tiene dificultad para **concentrarse** cómo resultado de los síntomas de su latigazo cervical?

En absoluto	0	1	2	3	4	5	6	7	8	9	10	Incapaz de concentrarme

Practical Applications

- The WDQ has been translated to a Spanish version, and it has shown excellent internal consistency and factor structure.
- The WDQ has strong correlation with other health measures (pain intensity, disability, and quality of life), no substantial floor or ceiling effects, and good interpretability.
- The Spanish version of the WDQ is considered a valid and reliable instrument to measure disability in people with acute whiplash-associated disorders to use in clinical applications.

References

1. Seroussi R, Singh V, Fry A. Chronic whiplash pain. *Phys Med Rehabil Clin North Am.* 2015;26(2):359-373.
2. Van Oosterwijck J, Nijs J, Meeus M, Paul L. Evidence for central sensitization in chronic whiplash: a systematic literature review. *Eur J Pain (London, England).* 2013;17(3):299-312.
3. Elliott JM, Pedler AR, Jull GA, Van Wyk L, Galloway GG, O'Leary SP. Differential changes in muscle composition exist in traumatic and nontraumatic neck pain. *Spine (Phila Pa 1976).* 2014;39(1):39-47.
4. Buitenhuis J, de Jong PJ, Jaspers JP, Groothoff JW. Catastrophizing and causal beliefs in whiplash. *Spine (Phila Pa 1976).* 2008;33(22):2427-2433; discussion 2434.
5. Stupar M, Cote P, Beaton DE, Boyle E, Cassidy JD. A test-retest reliability study of the whiplash disability questionnaire in patients with acute whiplash-associated disorders. *J Manipulative Physiol Ther.* 2015;38(9):629-636.
6. Serrano-Munoz D, Gómez-Soriano J, Ávila-Martín G, et al. Sensibilización central al dolor en pacientes con síndrome del latigazo cervical: una revisión. *Rev Latinoam Cir Ortop.* 2016;1(3):102-107.
7. Herren-Gerber R, Weiss S, Arendt-Nielsen L, et al. Modulation of central hypersensitivity by nociceptive input in chronic pain after whiplash injury. *Pain Med.* 2004;5(4):366-376.
8. Sterling M. Physiotherapy management of whiplash-associated disorders (WAD). *J Physiother.* 2014;60(1):5-12.
9. Stupar M, Cote P, Beaton DE, Boyle E, Cassidy JD. Structural and construct validity of the Whiplash Disability Questionnaire in adults with acute whiplash-associated disorders. *Spine J.* 2015;15(11):2369-2377.
10. Pinfold M, Niere KR, O'Leary EF, Hoving JL, Green S, Buchbinder R. Validity and internal consistency of a whiplash-specific disability measure. *Spine (Phila Pa 1976).* 2004;29(3):263-268.
11. Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. *J Manipulative Physiol Ther.* 1991;14(7):409-415.
12. Spitzer WO, Skovron ML, Salmi LR, et al. Scientific monograph of the Quebec Task Force on Whiplash-Associated Disorders: redefining "whiplash" and its management. *Spine (Phila Pa 1976).* 1995;20(8 suppl):1S-73S.
13. Terwee CB, Bot SD, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol.* 2007;60(1):34-42.
14. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *J Clin Epidemiol.* 1993;46(12):1417-1432.
15. Vilagut G, Ferrer M, Rajmil L, et al. The Spanish version of the Short Form 36 Health Survey: a decade of experience and new developments. *Gac Sanit.* 2005;19(2):135-150.
16. Andrade Ortega JA, Delgado Martinez AD, Almecija Ruiz R. Validation of a Spanish version of the Neck Disability Index. *Med Clin (Barc).* 2008;130(3):85-89.
17. Bijur PE, Latimer CT, Gallagher EJ. Validation of a verbally administered numerical rating scale of acute pain for use in the emergency department. *Acad Emerg Med.* 2003;10(4):390-392.
18. Rothaug J, Weiss T, Meissner W. How simple can it get? Measuring pain with NRS items or binary items. *Clin J Pain.* 2013;29(3):224-232.
19. Leak AM, Cooper J, Dyer S, Williams KA, Turner-Stokes L, Frank AO. The Northwick Park Neck Pain Questionnaire, devised to measure neck pain and disability. *Br J Rheumatol.* 1994;33(5):469-474.
20. Andrade Ortega JA, Delgado Martinez AD, Almecija Ruiz R. Validation of the Spanish version of the Neck Disability Index. *Spine (Phila Pa 1976).* 2010;35(4):E114-E118.
21. Gonzalez T, Balsa A, Sainz de Murieta J, Zamorano E, Gonzalez I, Martin-Mola E. Spanish version of the Northwick Park Neck Pain Questionnaire: reliability and validity. *Clin Exp Rheumatol.* 2001;19(1):41-46.
22. Bland JM, Altman DG. Cronbach's alpha. *BMJ.* 1997;314(7080):572.
23. Schuster C, McCaskey M, Ettlin T. German translation, cross-cultural adaptation and validation of the whiplash disability questionnaire. *Health Qual Life Outcomes.* 2013;11(1):45.
24. Niere K. The Whiplash Disability Questionnaire (WDQ). *Aust J Physiother.* 2006;52(2):151.
25. Ngo T, Stupar M, Cote P, Boyle E, Shearer H. A study of the test-retest reliability of the self-perceived general recovery and self-perceived change in neck pain questions in patients with recent whiplash-associated disorders. *Eur Spine J.* 2010;19(6):957-962.