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Cross-cultural Adaptation of the Victorian Institute of Sport Assessment-Achilles (VISA-A) Questionnaire for Spanish Athletes With Achilles Tendinopathy

Achilles tendinopathy is a chronic condition characterized by localized pain over the Achilles tendon, usually associated with physical activity and sports.[25] Patients often report morning stiffness in the Achilles tendon and focal tenderness. Symptoms can occur at the midportion or insertion of the tendon,[31] resulting in a decrease in functional capacity and athletic performance.

STUDY DESIGN: Clinical measurement study.

BACKGROUND: Achilles tendinopathy is a prevalent sport-related injury. The Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire is a widely used patient-reported outcome to assess the severity of symptoms for this injury.

OBJECTIVE: To adapt the VISA-A questionnaire into Spanish and to assess its psychometric properties.

METHODS: Cross-cultural adaptation was conducted according to recommended guidelines. The Spanish VISA-A (VISA-A-Sp) questionnaire was administered to 210 subjects: 70 healthy students, 70 active at-risk subjects (participating in running and jumping), and 70 patients diagnosed with Achilles tendinopathy. Participants were assessed at baseline and after 3 to 5 days. The injured subjects were also evaluated with a quality-of-life questionnaire (Medical Outcomes Study 36-Item Short-Form Health Survey [SF-36]) and at discharge. The final VISA-A-Sp was evaluated for reliability, validity, and responsiveness.

RESULTS: Cronbach alpha for the VISA-A-Sp was greater than .8. The intraclass correlation coefficient (model 2,1) was 0.993 (95% confidence interval: 0.991, 0.995; $P<.05$). In the confirmatory factor analysis, a 1-factor solution obtained a relatively good fit. Subjects with Achilles tendinopathy scored significantly lower than the other 2 groups ($P<.001$). The VISA-A-Sp score within the Achilles tendinopathy group showed significant correlations with SF-36 physical components (Spearman rho>0.5, $P<.001$). The standard error of the measurement was 2.53, and the minimal detectable change at the 95% confidence level was 7 points. The responsiveness indicators included an effect size of 2.16 and a standardized response mean of 1.92.

CONCLUSION: The VISA-A-Sp showed satisfactory psychometric properties that were comparable to the original English-language version. Therefore, it can be recommended for use in clinical practice and research for assessing the severity of symptoms in Spanish-speaking athletes who suffer from Achilles tendinopathy. *J Orthop Sports Phys Ther 2018;48(2):111-120. Epub 13 Dec 2017. doi:10.2519/jospt.2018.7402*

KEY WORDS: *Achilles tendinopathy, patient-reported outcome measure, Spanish, validation*

The reported prevalence of Achilles tendinopathy for active individuals ranges from 9% to 40%, depending on type and level of sport activity,[11] but these data may be even higher due to study limitations.[5]

The underlying pathology suggests a failed healing response of the Achilles tendon, including intratendinous changes evidenced by proper imaging techniques.[8] However, correlation between imaging and clinical symptoms is low.[16] Considering Achilles tendinopathy pathophysiology and its functional impact on active individuals, it is essential to have specific outcomes that can evaluate its functional consequences.[10] Patient-reported outcome measures can be useful for that purpose.[9] In fact, self-reported outcomes may help to assess some aspects of a patient's health status that cannot be directly observed (such as pain or related disability).[16]

The Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire was developed as a self-administered tool for assessing the severity of symptoms in English-speaking patients with Achilles tendinopathy.[38] The VISA-A questionnaire rates symptoms related to different tendon-load situations and assesses

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their impact during sports participation. It is considered a valuable outcome for monitoring Achilles tendinopathy symptoms.[22] The VISA-A questionnaire has been adapted into different languages, including Swedish,[41] Italian,[32] Dutch,[12] German,[28] Turkish,[14] Danish,[22] and French.[25] The psychometric properties of these versions of the VISA-A are summarized in **TABLE 1**. Although the use of different translated versions of the VISA-A has increased in both clinic and research settings,[32] development of different versions of this questionnaire remains relevant.[41]

For the proper use of patient-reported outcomes in a different language or culture, a systematic process of adaptation and validation is required.[34] Spanish is the second worldwide language, with 558 million Spanish speakers.[23] Due to the absence of a tool available in Spanish for evaluating changes in trials including patients with Achilles tendinopathy, the aim of the current study was to translate and cross-culturally adapt the VISA-A questionnaire into Spanish and to assess its psychometric properties in athletes with Achilles tendinopathy.

METHODS

Cross-cultural Adaptation

A cultural and linguistic adaptation of the questionnaire items and subsequent assessment of the psychometric properties of the instrument were conducted.[34] The translation process was performed following the international recommendations of Beaton et al[3] (**FIGURE 1**).

Translation and Synthesis Two independent bilingual persons translated the VISA-A questionnaire from English to Spanish: a sports physical therapist and an expert in English philology without a health sciences background. After both translated versions were completed, a meeting was held to produce a consensus version in Spanish.

Back Translation Back translation was also completed independently by 2 native English speakers fluent in Spanish and blinded to the original VISA-A questionnaire: a physical therapist and a native

TABLE 1 Psychometric Properties of the Original and Published Adaptations of the VISA-A

	Reliability			
	Internal Consistency	Test-Retest	Interval, d	Validity
English	NA	Pearson *r* = 0.81*	7	Spearman rho with the Percy-Conochie grade of severity was 0.58,† and with the Curwin-Stanish tendon grading system was −0.57†
Swedish	Cronbach α = .77	Patients, n = 22 Pearson *r* = 0.89, ICC = 0.89	7	Exploratory factor analysis: 2-factor solution (factor 1, items 1-6: pain/symptoms and factor 2, items 7 and 8: physical activity) Percent variance explained: NA Spearman rho with Stanish grading system was −0.68†
Dutch	Cronbach α = .78	Patients, n = 55 ICC = 0.97 (CI: 0.95, 0.98)	4-5	Pearson *r* with the AOFAS was 0.56*; with the VAS for pain and the VAS for function was −0.54* and 0.50,* respectively; and with the FAOS symptoms, pain, sport, activities of daily living, and quality of life subscales was 0.55* to 0.59* Pearson *r* was 0.31* to 0.70* with the following SF-36 physical components: PCS, RP, PF, and BP; and was 0.04 to 0.37 with other social and mental dimensions (SF, MH, RE, VT, GHP, MCS)
Italian	NA	Cohen κ = 0.80 (CI: 0.70, 0.86)	0‡	NA
German	Cronbach α = .74	Patients, n = 15 ICC = 0.87	7	Spearman rho with the Percy-Conochie grade of severity was 0.95,† and with the Curwin-Stanish tendon grading system was −0.95†
Turkish	Cronbach α = .66	Pearson *r* = 0.99* Split-half reliability coefficient = 0.77	7	Spearman rho with the Stanish et al tendon grading system was −0.86,† with the Grimby et al physical activity grading system was 0.74,† and with the physical domain of the WHOQOL-BREF was 0.37† Spearman rho with the social domain of the WHOQOL-BREF was 0.13 (*P*>.05)
Danish	Cronbach α = .73	Pearson *r* = 0.80* ICC = 0.79	2-5	Achilles tendinopathy patients had a significantly lower score† compared with the healthy controls
French	Cronbach α = .90	ICC = 0.99 (CI: 0.996, 0.998)	0‡	Spearman rho was 0.41* to 0.57* with physical components of the SF-36 (PF, RP, BP, GHP) and moderate to weakly correlated (0.19-0.39*) for mental components (MH, RE, SF, VT)

Abbreviations: AOFAS, American Orthopaedic Foot and Ankle Society score; BP, bodily pain; CI, confidence interval; FAOS, Foot and Ankle Outcome Score; GHP, general health perception; ICC, intraclass correlation coefficient; MCS, mental component summary; MH, mental health; NA, not available; PCS, physical component summary; PF, physical functioning; RE, role emotional; RP, role physical; SF, social functioning; SF-36, Medical Outcomes Study 36-Item Short-Form Health Survey; VAS, visual analog scale; VISA-A, Victorian Institute of Sport Assessment-Achilles; VT, vitality; WHOQOL-BREF, World Health Organization Quality of Life-BREF questionnaire.
**P<.05.*
†P<.01.
‡Twice within 30 minutes.

English teacher without a medical background. A consensus back-translated version was obtained.

Expert Committee Review All involved translators, together with the research team members, drafted the final version in communication with one of the original authors.

Pretesting The Spanish prefinal version of the VISA-A questionnaire was tested in a preliminary sample of 11 subjects with Achilles tendinopathy (mean ± SD age, 26 ± 6 years; 8 men) to assess whether this version was properly understandable and had appropriate vocabulary and proper expressions relevant to the Spanish language and culture.

Validation Study Instruments and procedures used for the validation phase are provided below.

Participants

A convenience sample of 210 physically active subjects were recruited: 70 healthy students of sport sciences and physiotherapy degrees at Miguel Hernández University practicing sport at least 3 times a week, but without high load to the Achilles tendon (swimming, fitness, rowing, and cycling); 70 subjects who participated at least 3 times per week in sports disciplines with an increased risk for Achilles tendinopathy (running, trail, or basketball); and 70 patients diagnosed with Achilles tendinopathy who belonged to 10 sport clubs and 5 private clinics in Spain.

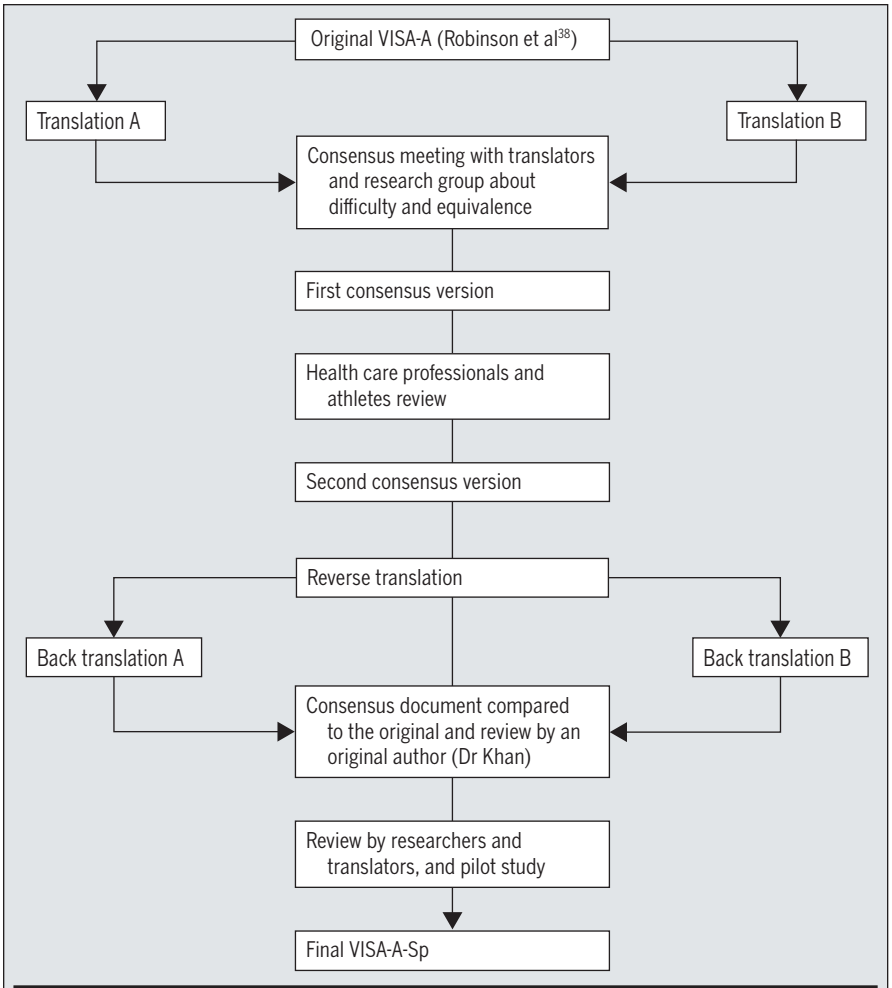

FIGURE 1. Flow chart of the steps for translation of the VISA-A (English to Spanish). Abbreviations: Sp, Spanish; VISA-A, Victorian Institute of Sport Assessment-Achilles.

Inclusion criteria for patients were the presence of a clinical diagnosis of Achilles tendinopathy, with tendon changes verified by ultrasound or magnetic resonance imaging (MRI); being older than 18 years of age; and being able to give written informed consent. For Achilles tendinopathy diagnosis, relevant aspects of the clinical history included history of pain and symptoms related to loading at the midportion of the tendon or at the calcaneal insertion and morning stiffness.[25] Participants were excluded if they had total or partial tendon rupture of the Achilles tendon, other simultaneous or recent injuries in the extremity, previous surgery, Haglund's disease, inflammatory or autoimmune conditions, or pregnancy. In cases of bilateral involvement, the most affected side was considered.

Instruments

The VISA-A questionnaire consists of 8 items.[38] The first 3 items rate pain or stiffness level on a numeric pain-rating questionnaire (0 to 10); the following 3 items are about pain during daily life activities (items 4 and 5) and the capacity to perform single-leg hops (item 6). The final 2 questions are about the impact of Achilles tendinopathy on sports participation (with categorical response options). The maximum possible score is 100 points, where higher scores are associated with lesser symptoms.

The Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) Spanish version was used for assessing convergent and divergent validity.[1] It is a generic measure of health status that includes 36 questions distributed across 8 domains: physical function, physical role, bodily pain, general health, vitality, social function, emotional role, and mental health. The scoring ranges from 0 to 100 points, with higher scores indicating better health status.

Procedure

All participants read and signed an informed-consent form prior to participation. The study protocol was approved

by the Ethics and Experimental Research Committee of Miguel Hernández University (DPC-SHS-001-11). Within healthy and at-risk groups, a member of the research team administered the questionnaires. Patients in the Achilles tendinopathy group were recruited from physical therapy services of 10 different sport clubs (running, athletics, handball, and basketball) and 5 private sport clinics in Spain. The principal investigator (S.H.S.) coordinated the physical therapists to ensure that all procedures were being conducted adequately. Patients were recruited between January 2013 and September 2015.

The assessment of psychometric properties of the VISA-A Spanish version (VISA-A-Sp) was conducted following the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) initiative.[35]

Reliability Reliability refers to both the degree of homogeneity of the questionnaire (internal consistency) as the reproducibility of the scores (temporal stability or test-retest reliability) and the absence of random errors.[43] Both internal consistency and temporal stability were studied in the total sample. For temporal stability evaluation, the VISA-A-Sp questionnaire was administered 3 to 5 days after the first assessment. It was assumed that the clinical status of the participants would not change during this period.[43] Measurement error was assessed in the same units of the questionnaire by calculating the standard error of measurement (SEM) and the minimum detectable change (MDC) in the Achilles tendinopathy group.[13,19] The MDC represents the minimal change that a patient has to exhibit on a questionnaire to ensure that the observed changes are real.[19] The SEM is an estimate of the expected variation in a set of stable scores, assuming that real change has not occurred.[13]

Validity Construct validity was studied through the analysis of the factor structure of the VISA-A-Sp questionnaire, using a confirmatory approach. Additionally, to assess convergent validity, correlation coefficients were calculated to check the relationship between the VISA-A-Sp and the SF-36 domains at baseline. External validity was tested by comparing VISA-A-Sp scores among groups.

For convergent validity, we hypothesized that correlations between scores of the VISA-A-Sp and physical dimensions of the SF-36 (physical functioning, physical role, bodily pain, and standardized physical component summary) would be higher than those correlations of the VISA-A-Sp score with other domains of the SF-36 (vitality, mental health, emotional role, social role, and general health perceptions).

Responsiveness For the responsiveness assessment, the VISA-A-Sp and SF-36 questionnaires were completed by each participant with Achilles tendinopathy at baseline and again at discharge or at 3 months (whichever came first) to assess change with physical therapy treatment. In most cases, the treatment included manual therapy, management of the tendon load (eg, exercises, training, and activity modifications), electrotherapy, and ultrasound-guided percutaneous electrolysis.

Feasibility Finally, to assess feasibility, we recorded the time that subjects spent filling out the questionnaire. Ceiling and floor effects were also measured, considered present when more than 15% of the responders achieved the theoretical minimum or maximum possible score.

Statistical Analysis

All statistical analyses were performed with IBM SPSS Statistics 23 (IBM Corporation, Armonk, NY) and EQS 6.1 software.[4] The Kolmogorov-Smirnov test was applied to assess the normal distribution of VISA-A-Sp scores in the total sample and for Achilles tendinopathy patients. For internal consistency, the Cronbach alpha was calculated. Test-retest reliability was studied using the intraclass correlation coefficient (ICC) model 2,1 and 95% confidence interval (CI). A Bland-Altman plot was constructed to show the agreement between individual subjects' scores. It includes a scatter plot of the differences between the baseline and the second VISA-A applications against their means, with 95% limits of agreement (mean difference $\pm 1.96 \times SD_{diff}$).

Dimensionality was assessed using a confirmatory factor analysis (CFA). Normality was checked using Mardia's normalized kurtosis coefficient and robust maximum-likelihood method. The following fit indexes were used in the CFA: (*a*) the Satorra-Bentler-scaled chi-square value divided by the degrees of freedom, (*b*) standardized root-mean-square residual (SRMR), (*c*) robust comparative fit index (CFI), and (*d*) root-mean-square error of approximation (RMSEA). A reasonable fit is indicated with an SRMR less than 0.08, a goodness-of-fit index of 0.90 or greater, and RMSEA less than 0.06 (indicating a good fit, whereas values greater than 0.08 represent an adequate fit).[21]

Between-group differences were analyzed using the Kruskal-Wallis test, with a post hoc Dunn test for multiple comparisons. The alpha level was set at .05. Correlation of the VISA-A-Sp scores with the SF-36 domains was calculated using Spearman rho. To compare VISA-A-Sp scores with scores on the original questionnaire and other adapted versions of the VISA-A, we used a 2-sample *t* test.

Effect size and standardized response mean (SRM) statistics were calculated as distribution-based responsiveness indicators and interpreted using Cohen's thresholds.[7] Effect size was calculated as the mean difference between baseline and discharge scores of the Achilles tendinopathy patients, divided by the standard deviation of the baseline scores. The SRM was calculated as the mean change scores divided by the standard deviation of the change scores.[27]

The parameters of error measurement were the SEM and MDC, and they were measured only in the Achilles tendinopathy group. The SEM was calculated as $SD \times \sqrt{1-R}$, where SD is the standard deviation of the first assessment and R is the reliability coefficient for the questionnaire. We used the $ICC_{2,1}$ of the ten-

dinopathy group, as recommended by Stratford.[42] To calculate MDC threshold at the individual level, we used the following formula: $MDC_{95} = 1.96 \times \sqrt{2} \times SEM$, where 1.96 is the value associated with the 95% CI and $\sqrt{2}$ accounts for the error associated with taking 2 measurements.

For the sample-size estimation, 2 aspects were considered. In the reliability study, for an alpha of .05, a statistical power of 0.80, lower limit $rho_{(0)}$ of 0.7, upper limit $rho_{(1)}$ of 0.9, and an estimated Spearman rho of 0.85, a total sample of 120 subjects was required. In addition, the recommendation of at least 200 cases to perform CFA was followed.[30]

RESULTS

Demographics

The participant demographic data and characteristics are presented in **TABLE 2**. Within the Achilles tendinopathy group, mean duration of symptoms was 12.1 ± 11.4 months; it was the first episode for 33% of the patients. The remaining 67% reported 2 (46%) or more (21%) episodes of recurrence. The right side was affected in 60% of the cases. The location of pain was at the body of the Achilles tendon in 64% of cases. Tendinopathy was confirmed with ultrasound in 56% of the patients and with MRI in 44%. Thirty-two of the 70 patients with Achilles tendinopathy had discontinued their sports activity at the time of the evaluation.

Translation

No important difficulties were reported during the translation process; however, the research team decided to introduce some changes in the prefinal questionnaire to improve the comprehensibility. In relation to item 2, some participants in the pretesting phase manifested doubts about the specific gesture to which the question refers. To clarify this, we attached a representative image near the item text (**APPENDIX**, available at www.jospt.org).

Additionally, to improve the self-administration, we decided to change the formal presentation of items 2 through 5. We introduced the pain-intensity number in boxes in increasing order and placed the scoring scale under the response boxes, to avoid misinterpretation, because in the original presentation, "no pain" corresponded to the number 10, which was cognitively contradictory for some patients.

Reliability

For internal consistency, Cronbach alpha was .89 for the first assessment and .88 for the second. When Cronbach alpha was analyzed for the questionnaire by eliminating each item one at a time, it ranged from .87 to .94. For test-retest assessment, ICC was 0.993 (95% CI: 0.991, 0.995; $P<.001$). In individual item analysis, all calculated ICCs ranged between 0.99 and 1.0. A Bland-Altman plot is presented in **FIGURE 2**, showing that the mean difference between the 2 applications of the VISA-A-Sp was −0.63 points (limits of agreement ranging from 4.64 to −5.90 points). The values for SEM and MDC_{95} at the individual level were 2.53 and 7 points, respectively.

Construct Validity: Factor Structure

The multivariate and univariate normality assumptions were checked. Range of values for univariate skewness (−1.31 to −0.82) and kurtosis (−0.77 to 1.51) indicated normality. Mardia's normalized multivariate value was 39.38, which indicated nonnormal distribution.

Confirmatory factor analysis was conducted to evaluate the fit of the 1-factor model, and robust statistics were used. Data indicated that the 1-factor model obtained a relatively good fit, with adequate values for Satorra-Bentler-scaled chi-square divided by the degrees of freedom, SRMR, CFI, and RMSEA. Thus, the model was statistically significant ($\chi^2_{20} = 47.03$, $P<.01$, but $\chi^2/df = 2.35$). The results for additional fit indexes examined were as follows: SRMR = 0.03, CFI = 0.98, and RMSEA = 0.08 (CI: 0.05, 0.12). Factor loadings for the 1-factor model related to the VISA-A-Sp scores are shown in **TABLE 3**.

Validity: Group Differences

Mean VISA-A-Sp scores for all groups are shown in **TABLE 4**. The VISA-A-Sp scores exhibited asymmetric distribution ($Z_{K\text{-}S} = 2.4$, $P<.001$) when all groups were considered together. The scores in the Achilles tendinopathy group showed a normal distribution. Differences between the VISA-A-Sp scores of the tendinopathy group and both healthy and at-risk groups were significant (43.8 and 38.2 points, respectively; $P<.01$). As shown in **FIGURE 3**, no differences between healthy and at-risk groups were observed (5.6 points, $P>.05$). Scores of the healthy and Achilles tendinopathy groups were

TABLE 2 Descriptive Characteristics and VISA-A-Sp Scores of the Study Population*

	Healthy	At Risk	Achilles Tendinopathy
Age, y	20.3 ± 2.8	24.1 ± 4.2	33.9 ± 12.0
Sex, n			
Men	60	54	34
Women	10	16	36
Body mass index, kg/m^2	23.3 ± 1.9	23.4 ± 1.8	23.9 ± 2.4
Training days per week	3.7 ± 0.7	4.5 ± 1.1	5.0 ± 1.1
Training hours per day	2.1 ± 0.4	2.85 ± 0.40	2.8 ± 1.0
First VISA-A-Sp	98.1 ± 1.8	92.6 ± 6.4	54.4 ± 12.6
Second VISA-A-Sp	98.1 ± 2.0	92.3 ± 6.1	56.5 ± 12.4

Abbreviation: VISA-A-Sp, Spanish version of the Victorian Institute of Sport Assessment-Achilles.
**Values are mean ± SD unless otherwise indicated.*

similar to those reported in previous versions of the VISA-A (P>.05), except for individuals for the English and Dutch versions, who scored slightly but significantly higher (**TABLE 4**).

Convergent and divergent validity was assessed for the Achilles tendinopathy group. Moderate correlations between the VISA-A-Sp score and the following SF-36 domains were found at baseline: physical function (r_s = 0.66, P<.001), physical role (r_s = 0.54, P<.001), bodily pain (r_s = 0.60, P<.001), and standardized physical component summary (r_s = 0.58, P<.001). However, the VISA-A-Sp score did not show significant correlation with social function (r_s = 0.21, P>.05), emotional role (r_s = −0.05, P>.05), general health (r_s = 0.11, P>.05), vitality (r_s = 0.23, P>.05), mental health (r_s = 0.32, P>.05), and standardized mental component summary (r_s = 0.03, P>.05). At discharge, correlations with the standardized physical and mental component summaries were 0.56 (P<.01) and 0.25 (P<.05), respectively.

The mean change in the VISA-A-Sp score for the tendinopathy group was 27.3 ± 14.4 points between baseline and discharge applications. There was a moderate and significant correlation with changes in the SF-36 standardized physical component summary score (r_s = 0.48, P<.01). The effect size was 2.165 and the SRM was 1.923.

Feasibility

Participants in the study spent less than 5 minutes completing the VISA-A-Sp questionnaire. No patient with Achilles tendinopathy achieved the highest or lowest possible score on the questionnaire. By item, no patient obtained a maximum or minimum score within more than 75% of the population. Therefore, no floor or ceiling effect occurred.

DISCUSSION

The most important finding of the present study was that the VISA-A-Sp questionnaire is an appropriate instrument to assess symptom severity in Spanish-speaking athletes with Achilles tendinopathy, in terms of validity and reliability.

Proper monitoring of clinical outcomes is considered essential for evidence-based physical therapy.[2] In order to achieve this professional standard, the use of valid and reliable self-reported outcomes is an effective strategy.[28] Therefore, to have an appropriate tool for assessing the impact of Achilles tendinopathy in Spanish-speaking active subjects, our objective was to cross-culturally adapt the VISA-A questionnaire into Spanish. Scott et al[39] recommended generating new adapted versions with proper evalu-

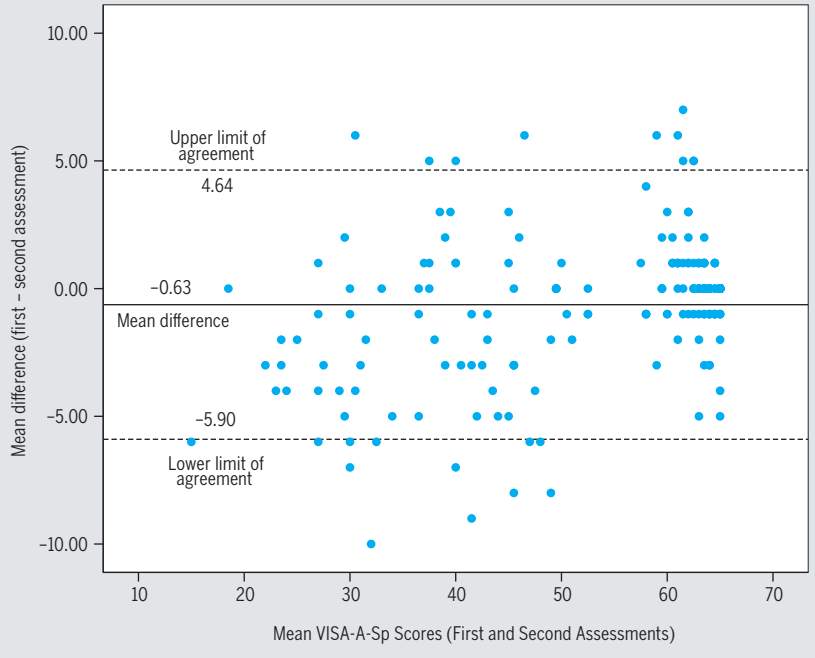

FIGURE 2. Bland-Altman plot showing agreement between test-retest measurements, where the limits of agreement are the mean difference ±1.96 × SD (dotted lines). Abbreviations: Sp, Spanish; VISA-A, Victorian Institute of Sport Assessment-Achilles.

TABLE 3 Factor Loadings for the 1-Factor Solution in the Confirmatory Factor Analysis

VISA-A Questionnaire Items		Component Loading
1.	For how many minutes do you have stiffness in the Achilles region on first getting up?	0.76
2.	Once you are warmed up for the day, do you have pain when stretching the Achilles tendon fully over the edge of a step (keeping knee straight)?	0.88
3.	After walking on flat ground for 30 minutes, do you have pain within the next 2 hours? (If unable to walk on flat ground for 30 minutes because of pain, score 0 for this question.)	0.84
4.	Do you have pain walking downstairs with a normal gait cycle?	0.75
5.	Do you have pain during or immediately after doing 10 (single-leg) heel raises from a flat surface?	0.86
6.	How many single-leg hops can you do without pain?	0.91
7.	Are you currently undertaking sport or other physical activity?	0.82
8.	For how long can you manage being physically active?	0.91

Abbreviation: VISA-A, Victorian Institute of Sport Assessment-Achilles.

ation of the psychometric properties as one way to facilitate the use of the VISA-A. After following the recommendations of the COSMIN initiative,[35] we found that the VISA-A-Sp showed good psychometric properties in our sample of Spanish subjects. It is also important to note that we did not find any discrepancies between the English and Spanish versions of the VISA-A, though some changes were introduced in the Spanish version to improve self-administration.

Psychometric Properties

Internal Consistency The Cronbach alpha value obtained for the total sample reflects adequate correlations among the items of the VISA-A questionnaire. It is similar to the French version,[25] and slightly higher than the value obtained in other adaptations, in which Cronbach alpha ranges from .66 to .78.[12,14,22,28,41]

We used the widely accepted cutoff for the Cronbach alpha of .7 or higher.[19] Calculating Cronbach alpha by subtracting single items revealed no significant changes in the overall Cronbach alpha, indicating no item redundancy.

Reliability Our results were similar to those of other adapted versions of the VISA-A in which the ICC was used.[12,22,25,28,41] In our assessment of the test-retest reliability, we used a large sample and a time interval of 3 to 5 days between applications. We considered the time interval proper to prevent recollection of previous answers and short enough for symptoms to vary unsubstantially.[43] In the Bland-Altman plot, the zero line was within the 95% CI of the mean difference between the second and first assessments, confirming that no systematic bias was observed.

Validity Mean VISA-A-Sp scores obtained by the healthy and Achilles tendinopathy groups are similar to those for the original version, and no statistically significant differences were found. Scores on the VISA-A questionnaire were able to discriminate between asymptomatic subjects and those with Achilles tendinopathy, but this questionnaire should not be considered as a diagnostic tool.[22,39] For this reason, we did not include a fourth group with other ankle or foot injuries. Ceiling and floor effects did not appear in our study, strengthening the validity of the VISA-A-Sp.

In relation to the construct validity, the factor structure of the VISA-A has seldom been examined in the literature. There are no data on the dimensionality of the original version, and only Silbernagel et al[41] reported results in the Swedish adaptation. Using an exploratory factor analysis in a sample of 51 patients, they found 2 factors: pain/symptoms (items 1-6) and physical activity (items 7-8). However, our results using a CFA show a unidimensional structure of the VISA-A-Sp underlying the construct "severity of the symptoms." This topic has also been discussed in the Victorian Institute of Sport Assessment-patella questionnaire.[6,20] This difference in the factor structure of the VISA-A questionnaire between versions could be due to the characteristics of the studied samples.

Measurement error refers to the systematic and random error of a patient's score that is not attributed to true changes in the concept that is being measured.[19] The SEM and MDC of the VISA-A questionnaire have only been reported for the Dutch version (4.1 and 11.3 points, respectively).[12] We obtained lower values in the Spanish version: 2.53 points for the SEM and 7 points for the MDC_{95}. This implies that to determine a real effect of a therapeutic intervention, a change of at least 7 points in the VISA-A-Sp score would be required to indicate that a real change has occurred.[19]

Little information has been reported about the responsiveness of the VISA-A questionnaire.[31] In the current study, the large effect size (greater than 0.8) provides evidence that the VISA-A-Sp can detect changes in symptom severity at 2 different points in the clinical course of Achilles tendinopathy. However, a practical indicator of responsiveness of clinical score changes is the minimum clinically

TABLE 4 VISA-A Scores for Different Groups in the Available Versions*

	Healthy		At Risk		Achilles Tendinopathy	
	n	VISA-A Score	n	VISA-A Score	n	VISA-A Score
English	63	96 ± 7	NA	NA	45	64 ± 17
Swedish	15	96 ± 4	NA	NA	51	50 ± 23
Dutch	48	98 ± 7	31	99 ± 2	71	52 ± 20
Italian	NA	NA	NA	NA	50	52 ± 18
German	48	98 ± 7	31	99 ± 2	15	73 ± 13
Turkish	55	97 ± 1	NA	NA	52	53 ± 14
Danish	75	93 ± 12	NA	NA	71	51 ± 19
French	22	99 ± 1	63	94 ± 7	31	59 ± 18
Spanish	70	98 ± 2	70	93 ± 6	70	54 ± 13

Abbreviations: NA, not available; VISA-A, Victorian Institute of Sport Assessment-Achilles.
**Values are mean ± SD points unless otherwise indicated.*

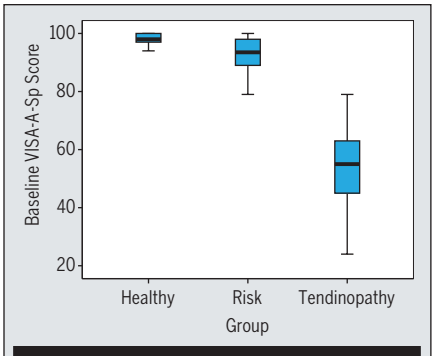

FIGURE 3. Mean scores on the VISA-A, with standard deviations. Differences between the healthy group and the pathology groups are shown. Abbreviations: Sp, Spanish; VISA-A, Victorian Institute of Sport Assessment-Achilles.

important difference (MCID), defined as the smallest change that is meaningful to the patient for an outcome measure, expressed in the same units as those of the questionnaire.[13] Tumilty et al[43] suggested that the MCID of the VISA-A questionnaire ranges from 12 to 20 points. However, McCormack et al[34] reported an MCID of 6.5 points. The selected sample size and the interpretation of a relevant change in the external anchor used in these studies are factors that could affect the results of the MCID estimation.[13] In addition, to avoid error measurement and to assess a clinical change, it is essential that the MCID value be higher than the MDC.[43] Norman et al[36] found that the value of 0.5 SD corresponds to the threshold of the MCID. Considering this premise, for our study, the threshold would be 6.5, which would agree with Iversen et al.[22] But given the highest SD reported for the VISA-A scores within patient groups in other studies, the threshold would be 11 points. Wyrwich[44] reported that the MCID in musculoskeletal disorders could be 2.3 or 2.6 times the SEM. Considering our data, with a SEM of 2.53, the MCID would be placed at 6.6 points.

Nevertheless, we are considering the minimum relevant change; although it is an important threshold, it does not generally represent a desirable treatment outcome for all patients.[38] The most clinically relevant changes from the patient's perspective correspond with greater magnitude changes in score, which are closer to the values of substantial clinical benefit.[18] In this sense, the expert panel consensus of the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials concluded that a 30% improvement in scores, relative to baseline, may be considered a clinically meaningful improvement when using a patient-reported outcome.[15] Considering this threshold, the MCID value in our sample would be 16 points, as stated by Tumilty et al.[43]

Therefore, it is important to determine the responsiveness and the MCID of the VISA-A in future studies associated with self-rated improvements in order to increase its clinical applicability and its value for clinical decision making.[13,38]

For example, in the return-to-sport program for patients with Achilles tendinopathy proposed by Silbernagel and Crossley,[40] the presence of pain/symptoms is integrated into the program for proper management of the individual. This is an example in which the use of the VISA-A questionnaire can help in clinical decision making and management. In fact, the Futbol Club Barcelona medical staff, in their guide to clinical practice for tendinopathies, specifically incorporate changes in the VISA-A score into the criteria to determine return-to-play status in players with Achilles tendinopathy.[17]

Finally, some limitations of the current study should be recognized. First, we did not include subjects treated surgically, as in the study developing the original version. As Maffulli et al[32] reported, current development in nonsurgical therapies has drastically reduced the number of athletes who receive surgical treatment for Achilles tendinopathy. Second, we have reported only distribution-based parameters for responsiveness, but these parameters do not provide information about clinical relevance. It could be interesting in future studies to estimate thresholds such as MCID. Third, there were fewer women in the healthy group than men. It would be interesting to analyze sex differences in future studies. Further, the Achilles tendinopathy group was older compared to the other 2 groups, so it would be interesting to explore results in younger subjects (eg, adolescents) with Achilles tendinopathy.

CONCLUSION

The Spanish version of the VISA-A questionnaire has demonstrated adequate reliability and validity. After the cross-cultural adaptation process, its psychometric properties are consistent with those of the original version. Further, the Spanish version is user friendly and can be easily self-administered. Therefore, the Spanish version of the VISA-A can be used as the main outcome by clinicians and researchers in Spanish-speaking athletes with Achilles tendinopathy for monitoring symptom course during treatment. ◉

KEY POINTS

FINDINGS: The Spanish version of the Victorian Institute of Sport Assessment-Achilles (VISA-A-Sp) questionnaire is a valid and reliable instrument to assess the severity of symptoms in athletes with Achilles tendinopathy. The VISA-A-Sp is comparable to the original version and other published international versions of the questionnaire.

IMPLICATIONS: The VISA-A-Sp questionnaire can be used as an outcome measure to assess Spanish-speaking athletes with Achilles tendinopathy and to monitor their symptoms after treatment.

CAUTION: Further research is necessary to determine the internal structure of the Victorian Institute of Sport Assessment-Achilles questionnaire and, prospectively, its minimum clinically important difference thresholds.

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APPENDIX

Cuestionario VISA-A para la valoración de la severidad clínica de la tendinopatía Aquílea

NOMBRE Y APELLIDOS: …… FECHA:…/…/……

En este cuestionario, el término dolor se refiere específicamente a la región del tendón de Aquiles. Para indicar su intensidad de dolor, por favor, marque de 0 a 10 en la escala de respuesta teniendo en cuenta que ***0 = ausencia de dolor y 10 = máximo dolor que imagina.***

1. ¿Durante cuántos minutos siente rigidez en la zona del tendón al levantarse por la mañana?

PUNTOS

0 minutos	0 min	10 min	20 min	30 min	40 min	50 min	60 min	70 min	80 min	90 min	100 min	**100 minutos**
	10	9	8	7	6	5	4	3	2	1	0	

2. Una vez que ha entrado en calor, ¿siente dolor al estirar completamente el tendón de Aquiles en el borde de un escalón *(sobre las puntas de los pies y con la rodilla extendida, como en la imagen)?*

PUNTOS

Sin dolor	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Dolor muy intenso**
	10	9	8	7	6	5	4	3	2	1	0	

3.- Después de caminar 30 minutos en llano, ¿siente dolor en el tendón en las dos horas siguientes?

Si no es capaz de andar durante 30 minutos en terreno llano, puntúe 0 en esta pregunta.

PUNTOS

Sin dolor	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Dolor muy intenso**
	10	9	8	7	6	5	4	3	2	1	0	

4.- ¿Le duele al bajar escaleras a un paso normal?

PUNTOS

Sin dolor	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Dolor muy intenso**
	10	9	8	7	6	5	4	3	2	1	0	

5.- ¿Le duele el tendón cuando se pone de puntillas 10 veces sobre la misma pierna en una superficie plana o inmediatamente después de hacerlo?

PUNTOS

Sin dolor	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Dolor muy intenso**
	10	9	8	7	6	5	4	3	2	1	0	

6.- ¿Cuántos saltos puede hacer sobre una sola pierna sin dolor en la zona del tendón?

PUNTOS

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0	1	2	3	4	5	6	7	8	9	10

CONTINÚA DETRÁS

APPENDIX

Cuestionario VISA-A para la valoración de la severidad clínica de la tendinopatía Aquílea

7.- ¿Practica actualmente algún deporte u otra actividad física?

PUNTOS

0	☐	No, en absoluto
4	☐	Entrenamiento y/o competición modificada
7	☐	Entrenamiento y/o competición completa, pero no al mismo nivel que cuando empezaron los síntomas
10	☐	Competición al mismo nivel o superior al que tenía cuando empezaron los síntomas

8.- Por favor, lea los siguientes apartados y conteste A, B o C en esta pregunta según el estado actual de su lesión:

- *Si no tiene dolor al realizar deportes que carguen (soliciten) el tendón de Aquiles, por favor, complete solamente la pregunta 8a*
- *Si tiene dolor mientras practica deportes de carga sobre el tendón de Aquiles pero éste no le impide finalizar la actividad, por favor, conteste solamente la cuestión 8b.*
- *Si tiene un dolor que le impide completar deportes que solicitan el tendón de Aquiles, por favor, complete únicamente la pregunta 8c.*

8a. Si no tiene dolor al realizar deportes que carguen el tendón de Aquiles ¿durante cuanto tiempo puede entrenar/practicar esos deportes?

PUNTOS

0	7	14	21	30
Nada	1-10 minutos	11-20 minutos	21-30 minutos	> 30 minutos

8b. Si tiene algo de dolor mientras practica deportes que carguen el tendón de Aquiles, pero no le impide completar su entrenamiento/práctica deportiva, ¿durante cuanto tiempo puede entrenar/practicar esos deportes?

PUNTOS

0	4	10	14	20
Nada	1-10 minutos	11-20 minutos	21-30 minutos	> 30 minutos

8c. Si tiene un dolor que le impide completar entrenamientos o deportes que carguen el tendón de Aquiles, ¿durante cuánto tiempo puede entrenar o practicar esos deportes?

PUNTOS

0	2	5	7	10
Nada	1-10 minutos	11-20 minutos	21-30 minutos	> 30 minutos

PUNTUACIÓN TOTAL: (/100)

2