



Systematic review of the psychometric properties of the Victorian Institute of Sports Assessment – Achilles tendinopathy questionnaire

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Implications for Rehabilitation

1. On available evidence, the **Spanish-language and Brazilian-Portuguese language versions of the Victorian Institute of Sports Assessment – Achilles questionnaire** are the most appropriate for patients with Achilles tendinopathy.
2. **Robust methods should be designed and implemented to obtain higher quality instruments for patients with Achilles tendinopathy to be used systematically in daily clinical practice.**
3. Most previous transcultural versions of **the Victorian Institute of Sports Assessment – Achilles tendinopathy questionnaire** have presented inadequate evidence of their psychometric properties and should be used with caution for patients with Achilles tendinopathy.

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3 **Systematic review of the psychometric properties of the Victorian Institute of**
4 **Sports Assessment – Achilles tendinopathy questionnaire**
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8 Running Head: Psychometric properties of the VISA-A questionnaire
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10 Article category: Systematic review
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For
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Abstract

Objective. To review the different versions of The Victorian Institute of Sports Assessment – Achilles questionnaire for Achilles tendinopathy to evaluate its psychometric properties and the methodological quality of these studies.

Methods. Systematic review. *Setting.* A search was conducted in the PubMed, SCOPUS, CINAHL, Physiotherapy Evidence Database and Google Scholar databases, based on the following inclusion criteria: population with Achilles tendinopathy >18 years; validation studies of the Victorian Institute of Sports Assessment- Achilles questionnaire, in different languages, with no time limit. Two of the present authors independently assessed the quality of the studies located and extracted the relevant data. Terwee's criteria and the COSMIN checklist were employed to ensure adequate methodological quality.

Results. Eleven instruments met the inclusion criteria for this review. Significant methodological flaws were detected, mostly regarding construct validity and responsiveness.

Conclusion. The cultural adaptation of the Spanish-language and Brazilian-Portuguese-language VISA-A presents adequate methodological quality. However, further studies are required, with greater methodological rigour, of the cultural adaptations of measurement instruments.

Key words: Achilles tendon, tendinopathy, psychometrics, systematic review.

Introduction

The Achilles tendon produces joint motion by transferring forces from the triceps surae muscle to the calcaneal bone [1]. It may be affected by disorders such as tendinopathy or rupture. These are frequently painful, and force 2-16% of runners and other athletes to abandon the activity [2]. Achilles tendon injuries have a prevalence of 10% among active individuals [3] and a reported incidence of 0.01/1000 km [4]. Players of other sports such as volleyball, basketball or squash are also affected [5], as are persons who, while not athletes, have an active lifestyle, involving hiking, walking, etc. [6].

The commonest aetiology of Achilles tendinopathy is overuse producing repetitive microtrauma, poor vascularity of the soft tissue, mechanical imbalances of the lower leg or a combination of these factors [7], which is probably the most common differential diagnosis of posterior heel pain [8]. Its main symptoms are tenderness and swelling of the midportion of the Achilles tendon, to 2 to 6 cm proximal to insertion into the calcaneus [9].

Robinson et al. [10] designed a self-administered questionnaire to measure outcomes, which was termed the Victorian Institute of Sports Assessment-Achilles questionnaire (VISA-A), following the model presented by the Victorian Institute of Sport Assessment-Patellar tendinopathy questionnaire.

The VISA-A is considered to be the most specific functional questionnaire available for determining the region and severity of Achilles tendinopathy. It is easily self-administered and readily comprehensible to patients. Moreover, it helps the clinician to evaluate the symptoms and effects on physical activity, to compare and determine the clinical signs and to monitor the effects of treatment [5]-[9].

VISA-A contains eight questions, on pain (questions 1-3), function (questions 4-6) and activity (questions 7 and 8). The maximum score for items one to seven is 10, while the eighth has a maximum of 30. Thus the total score assigned can range from 0 (total disability) to 100 points (asymptomatic) [11].

This questionnaire has been formally cross-culturally adapted into Swedish [12], Italian [13], German [6], Turkish [14], Danish [9], French [5], Spanish [15], Dutch [11], Chilean-Spanish [16] and Brazilian-Portuguese [17]. The aim of the present study is to review the different versions of VISA-A for Achilles tendinopathy (including the original and successive cultural adaptations) to evaluate their psychometric properties

and the methodological quality of the validation studies to better inform clinicians about this instrument for evaluating self-report assessment of Achilles tendinopathy.

Material and Methods

The review protocol was registered at the International Prospective Register of Systematic Reviews (PROSPERO: CRD XXXXXXXXXXXXX) prior to the identification of articles and data extraction.

Design. A systematic review of the psychometric properties of the VISA-A questionnaire.

Search strategy

The study selection process was based on the PRISMA statement for systematic reviews [18]. The database search was carried out by examining five databases: PubMed, Scopus, CINAHL, Physiotherapy Evidence Database and Google Scholar, from inception until January 2019. All databases were searched again at the end of June 2019.

The following search terms were used, together with the operators “OR” and “AND”: "Achilles tendon"[MeSH Terms], "tendinopathy"[MeSH Terms], "surveys and questionnaires"[MeSH Terms], reliability, validity, cross-cultural adaptation, thus: (“Achilles tendon”[MeSH Terms] OR (“Achilles”[All Fields] AND “tendon”[All Fields]) OR “Achilles tendon”[All Fields]) OR Achilles tendinopathy[title] AND ((“surveys and questionnaires”[MeSH Terms] OR (“surveys”[All Fields] AND “questionnaires”[All Fields]) OR “surveys and questionnaires”[All Fields] OR “questionnaire”[All Fields]) OR (cross-cultural[All Fields] AND (“acclimatization”[MeSH Terms] OR “acclimatization”[All Fields] OR “adaptation”[All Fields]))) AND (reliability[All Fields] AND validity[All Fields]).

Inclusion criteria

- Types of participants: Patients with Achilles tendinopathy aged >18 years. The studies should be specifically focused on the validity and reliability of the VISA-A questionnaire.
- Types of study: original questionnaire and transcultural adaptations of the VISA-A.
- Types of outcome: Psychometric or clinimetric properties based on *COSMIN* [19] (Structural validity; Internal consistency; Reliability; Measurement error; Hypothesis testing for construct validity; Cross cultural validity/Measurement

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3 invariance; Criterion validity; Responsiveness) or *Terwee* [20] (content validity;
4 internal consistency; criterion validity; construct validity; reproducibility (agreement
5 and reliability); responsiveness; floor/ceiling effect; interpretability).
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8 9 *Exclusion criteria*

- 10 • Studies published in languages other than English or Spanish and those based on
11 questionnaires of orthopaedic injuries
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14 15 *Quality appraisal*

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17 The updated COSMIN checklist was used to evaluate the methodological quality of the
18 studies performed to investigate the measurement properties of each patient-reported
19 outcome measure [21] (Figure 1 near here). This standard can be used both to assess the
20 methodological quality of studies of patient-reported outcome measure [22] and to
21 compare the measurement properties of various instruments, in a systematic review
22 [23]. Each of the properties observed was rated as sufficient ('+'), insufficient ('-') or
23 indeterminate ('?') Measurement properties were considered with respect to three
24 domains: reliability, validity and responsiveness. Each property contained various
25 items, evaluated on a 4-point Likert scale as poor, fair, good or excellent. The “worst
26 score counts” approach was applied to derive a final rating for the patient-reported
27 outcome measure.
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31 With respect to the psychometric properties proposed by Terwee [20], each issue was
32 rated as positive “+” (adequate description or value or measure or argument related to
33 the psychometric property), negative “-” (inadequate or values below the accepted
34 standards for the psychometric property), indeterminate “?” (doubtful methods or
35 measures or design) or absent “0” (no information available about the psychometric
36 property), except for responsiveness, which was rated only as present/absent.
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49 50 *Study selection*

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52 Two blinded reviewers (XXX and XXX) evaluated all the studies obtained. Any
53 discrepancies in the process were resolved by discussion between them, assisted by the
54 intervention of the third and fourth reviewers (XXX and XXX).
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Data extraction

The study titles and abstracts were then reviewed independently by two reviewers (XXX and XXX) and relevant articles were then obtained in full text. The same reviewers undertook the second stage of screening by reading the full text of selected articles. If there was any absent or uncertain information, the study authors were contacted.

The following data extracted from eligible studies were included: year of publication; full title (original questionnaire or transcultural adaptation); dimension and structure; population used for the validation process; psychometric properties (Terwee's criteria with a positive rating), COSMIN criteria.

No meta-analysis was carried out due to the heterogeneity of the outcomes included in these studies.

Results

In the first stage of the review, 628 potential studies were identified, of which 536 were duplicated among the different databases. The remaining 92 were then screened, starting with an appraisal of the titles and abstracts. A total of 73 studies failed to meet the inclusion criteria and were discarded. After the methodological analysis, a further 8 studies were excluded. Thus, we finally examined 11 full-text articles, all of which fully met the inclusion criteria. The flow of the process for study selection was based on the PRISMA statement for systematic reviews [18] (Figure 2 near here).

Study characteristics

The studies included are shown in Table 1 (near here).

The VISA-A questionnaire is a self-administered tool that consists of eight items, focusing on three major domains: pain, function and activity[10]. The questionnaire has been culturally adapted into eleven different languages (Table 2).

The studies considered included a total of 1198 participants (32.88% of whom were female and 67.12%, male). Of these patients, 968 took part in transcultural adaptations, in addition to the 142 who participated in the design and evaluation of the original VISA-A questionnaire. These persons were classified according to the presence or absence of Achilles tendinopathy, and whether they were athletes or members of a risk group or control group in the respective transcultural adaptations. The average age of

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3 the participants with Achilles tendinopathy was 44.5 years and that of those in the
4 healthy (control) group was 30.5 years.

7 *Psychometric properties*

9 The psychometric properties of the studies are summarised in Tables 2 and 3 (near
10 here), following Terwee's criteria.

13 In our review, the Spanish version of VISA-A presented the best overall psychometric
14 properties, with positive evidence for content validity (clear description of measurement
15 aim, target population, item selection and reduction), internal consistency (Cronbach's
16 alpha 0.70-0.95), construct validity (evidence from factor analysis to confirm the study
17 hypotheses), reproducibility/agreement (4.64 to -5.90 points, mean difference -0.63 (SD
18 1.96), reproducibility/reliability (ICC > 0.7), responsiveness (minimal important change:
19 6.6), floor/ceiling effect (0%) and interpretability ("Healthy" mean 98 (SD 2.0), "At
20 risk" mean 92.6 (SD 6.4) and "Achilles Tendinopathy" mean 54 (SD 13.0). A negative
21 value was only obtained for criterion validity.

23 Other instruments, such as the adaptation to Brazilian-Portuguese, had good
24 psychometric properties, and achieved a positive rating for seven criteria.

27 With respect to criterion validity, reproducibility, agreement, responsiveness and
28 interpretability, positive ratings were obtained in very few cases. Most of the cultural
29 adaptations considered obtained an indeterminate or absent rating.

32 *Methodological quality*

33 The Spanish and Brazilian-Portuguese versions of VISA-A were assessed by the
34 COSMIN criteria for methodological quality (Table 4, near here). Each of these cross-
35 cultural adaptations had a positive rating in seven criteria. The Spanish-language
36 version had a positive rating for structural validity, internal consistency, reliability,
37 measurement error, hypothesis testing for construct validity, cross-cultural validity and
38 responsiveness, and a negative one for criterion validity. The Brazilian-Portuguese-
39 language version had a positive rating for internal consistency, reliability, measurement
40 error, hypothesis testing for construct validity, cross-cultural validity, criterion validity
41 and responsiveness.

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3 The next best results were obtained by the Dutch version of VISA-A, with five positive
4 criteria, for internal consistency, reliability, measurement error, hypothesis testing for
5 construct validity and cross-cultural validity; a negative one was obtained for structural
6 validity, criterion validity and responsiveness. However, all three versions presented
7 poor methodological quality.
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10 For the following properties, the multicultural versions and even the original text had
11 few positive ratings, often presenting missing or unknown data: structural validity
12 (evaluation by factor analysis or IRT/Rasch analysis was not assured), measurement
13 error (patient-reported outcome measures were not defined by minimally-important
14 change), hypothesis testing (hypothesis not defined or results conflicting with the
15 hypothesis) or responsiveness (no hypothesis defined, results conflicting with the
16 hypothesis or area under the curve <0.70).
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30 **Discussion**

31 The purpose of our review was to evaluate the different versions of VISA-A for
32 Achilles tendinopathy (the original and successive cultural adaptations) in terms of their
33 psychometric properties and methodological quality, in order to inform clinicians more
34 precisely about this instrument for evaluating self-reported assessments of Achilles
35 tendinopathy.
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42 The VISA-A questionnaire focuses on three domains: pain, function and activity. Its
43 reliability score for systematic use is ICC 0.91[24]. Although the cultural adaptations
44 into Swedish [12] and Spanish [15] claimed to have performed factorial and
45 confirmatory analysis, in both cases there were important errors in the methodology and
46 analysis employed, since no account was taken of the sample size required for this
47 analysis, and in both cases the sample size was unacceptably low.
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53 With respect to the sample population, the participants classified as belonging to the
54 Achilles tendinopathy group were not diagnosed by complementary tests such as
55 ultrasound or magnetic resonance, but only by the symptoms presented by the patient or
56 by the location of pain in the tendon [6][9]-[12][14]. Only the French [5] and Spanish
57 [15] versions took into account the fact that patients in the group with tendinopathy had
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3 been diagnosed by an imaging test in order to participate in the cross-cultural adaptation
4 of the questionnaire. Their participation was not obligatory, which increased the quality
5 of the cross-cultural version.
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9 Our analysis of the cultural adaptations included in the study sample, and of the original
10 questionnaire, showed that the Spanish-language and Brazilian-Portuguese-language
11 cultural adaptations presented the best overall psychometric properties and
12 methodological quality, with a high number of items classified as positive according to
13 COSMIN and Terwee's criteria [15]. The COSMIN classification revealed positive
14 values for all the criteria except criterion validity and structural validity. In terms of
15 methodological quality, these versions were followed by the Dutch version, which
16 obtained a positive score for five criteria. The other adaptations, and even the original
17 questionnaire, presented only low-to-moderate quality. Although some of them
18 followed a protocol or guidelines, seeking to achieve an adequate cultural adaptation,
19 the outcome was unsuccessful [5] [9-[14]. Thus, in most cases there were deficiencies in
20 criterion validity, construct validity and responsiveness. It is important to highlight
21 these shortcomings, as they may have significant consequences in clinical and research
22 contexts. Regarding criterion validity, it is important to ensure exactly what is being
23 measured, because if the criterion is influenced by other conditions affecting the
24 leg/foot, it can be difficult to determine the degree of injury. Construct validation is an
25 on-going process of learning, prediction and testing [25]. If it is not performed
26 appropriately, the resulting conclusions on assisting patients in the development of self-
27 management skills will be unreliable and discounted.
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31 The criterion of responsiveness is of crucial importance in clinical practice, revealing
32 the clinically important changes that must be observed and helping physicians and
33 patients monitor the condition. **It must be able to determine whether a patient is
34 experiencing important changes during the recovery process, which itself can influence
35 the intensity and duration of treatment[26]**
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39 The use of VISA-A in clinical practice as a fundamental instrument for assessing the
40 patient's condition should be based on versions that have undergone a robust validation
41 process, and practitioners should be cautious in choosing the version to be used for
42 decision-making, **since parallel-forms reliability and validation through structural
43 equations have not been carried out correctly or present very different results[24]. It is
44 important to determine the reliability of any questionnaire to be able to determine**
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3 whether it can be used systematically in daily clinical practice. This requires
4 undertaking reliability studies in relevant patients (in the case of the VISA-A, patients
5 with Achilles tendinopathies)
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9 The main strength of this study is the rigorous method developed for the systematic
10 review, which included a blinded peer-review of quality appraisal using a standard
11 method, COSMIN, and an exhaustive process for locating studies and versions of the
12 instrument. On the other hand, our review also has certain limitations, due to the
13 incompleteness of some of the data obtained, despite our attempts to contact the original
14 authors. Furthermore, there was some heterogeneity regarding the type of subjects
15 included in the studies considered; some included only healthy volunteers while others
16 selected both healthy and affected subjects.
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19 We recommend that patient-reported outcome measures that present poor evidence of
20 their psychometric properties should be used with caution. Future studies with robust
21 methods should be developed to examine these lower-quality versions, preferably with a
22 larger sample population and ensuring an even male/female balance among participants.
23 Most of the transcultural adaptations made of the VISA-A questionnaire present a low
24 level of methodological quality. According to the COSMIN criteria, the Spanish-
25 language and Brazilian-Portuguese-language adaptations provide the best psychometric
26 properties, followed by the Dutch version. The VISA-A is a reliable tool to assess
27 symptoms and repercussions of Achilles tendinopathies.
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Figure 1. Instruction for completing COSMIN

Figure 2. Flow diagram

Table 1. Instruments included

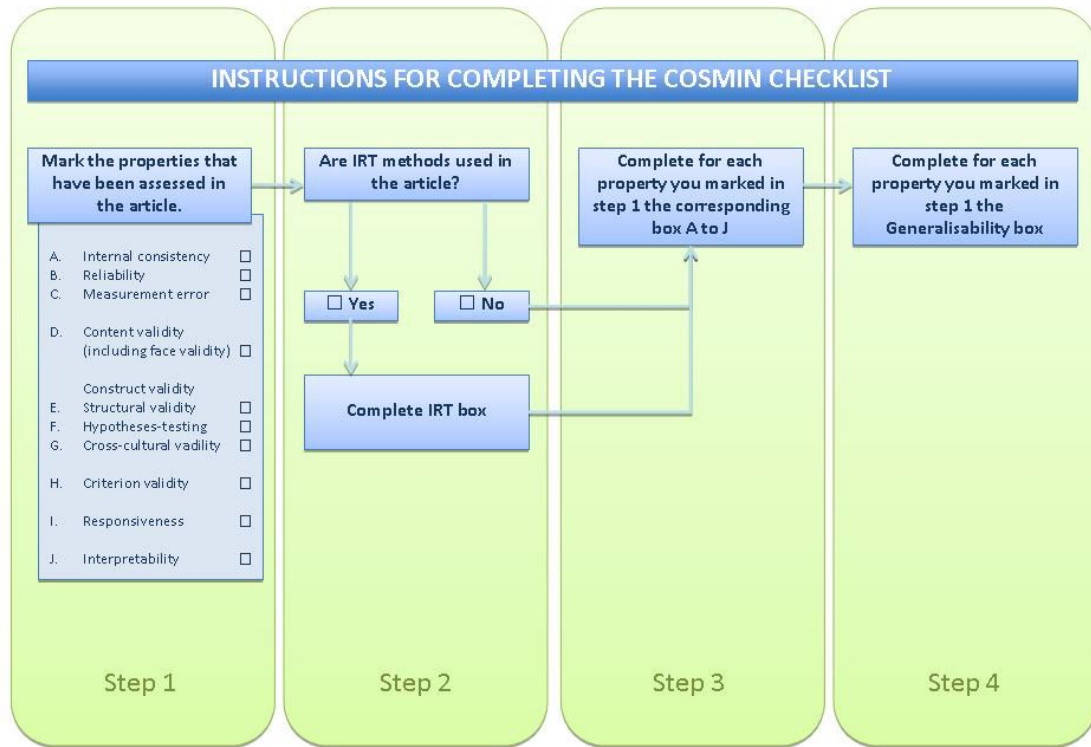
Table 2. Characteristics of the VISA-A questionnaire and its cross-cultural adaptations

Table 3. Assessment of the measurement properties of the questionnaires

Table 4. Summary of COSMIN ratings

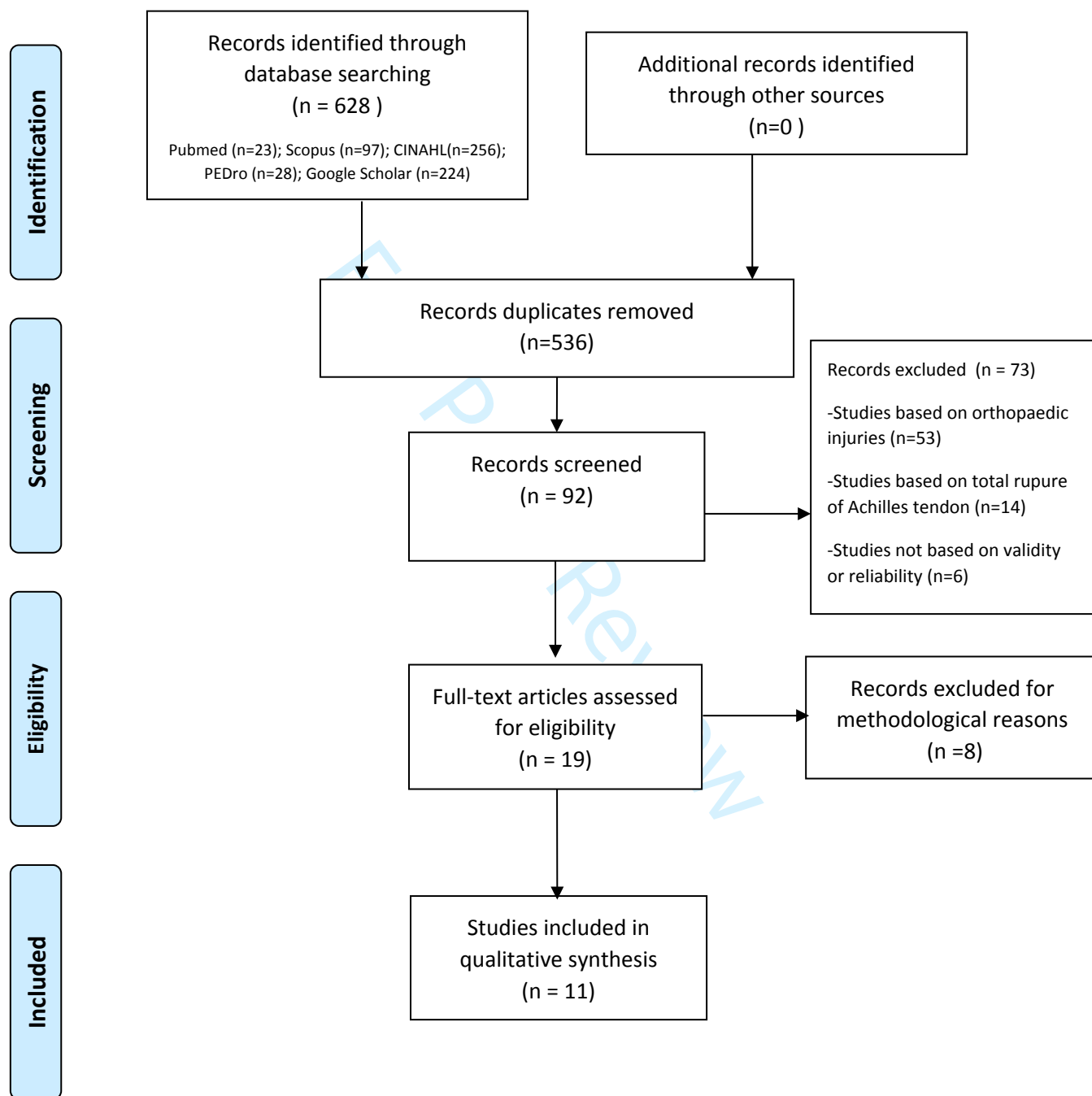
For Peer Review

Figure 1. Instructions for completing the COSMIN checklist



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Figure 2. PRISMA Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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Table 1. Instrument included and its adaptations.

	FULL TITLE
VISA-A (2001)	The VISA-A questionnaire: a valid and reliable index of the clinical severity of Achilles tendinopathy.
VISA-A (2005)	Cross-cultural adaptation of the VISA-A questionnaire, an index of clinical severity for patients with Achilles Tendinopathy, with reliability, validity and structure evaluations.
VISA-A (2008)	Italian translation of the VISA-A score for tendinopathy of the main body of the Achilles tendon.
VISA-A (2009)	Cross-cultural adaptation and validation of the VISA-A questionnaire for German-speaking Achilles tendinopathy patients.
VISA-A (2011)	Validation of the VISA-A questionnaire for Turkish language: the VISA-A-Tr study.
VISA-A (2015)	Danish VISA-A questionnaire with validation and reliability testing for Danish-speaking Achilles tendinopathy patients.
VISA-A (2016)	Validity and reliability of the French translation of the VISA-A questionnaire for Achilles tendinopathy.
VISA-A (2017)	Cross-cultural adaptation of the VISA-A questionnaire for Spanish athletes with Achilles tendinopathy.
VISA-A (2018)	Dutch version of the Victorian Institute of Sports Assessment-Achilles questionnaire for Achilles Tendinopathy: Reliability, validity and applicability to non-athletes.
VISA-A (2018)	Cross-cultural adaptation and validation of the VISA-A questionnaire for Chilean Spanish-speaking patients.
VISA-A (2018)	Cross-cultural adaptation and measurement properties of the Brazilian Portuguese version of the VISA-A questionnaire.

VISA-A: The Victorian Institute of Sports Assessment – Achilles.

Table 2. Characteristics of the Victorian Institute of Sports Assessment – Achilles questionnaire and its cross-cultural adaptations

Year of publication	Original questionnaire	Dimensions and structure	Population used for validation	Psychometric properties
2001	ENGLISH	Self-administered tool 8 items 3 domains: pain, function and activity	N=142 (64 female; 78 male) Group 1: n= 45 (non- surgical patients); 42.3 (SD:11.4) years Group 2: n= 14 (presurgical patients); 44.3 (SD: 14.8) years Group 3: n= 63 (university students as control group); 23.0 (SD: 2.9) years Group 4: n=20 (runners); 40.9 (SD: 9.1) years	Content validity: Item generation, item reduction, item scaling and pretesting. Validity testing. Criterion validity: Spearman r with Percy & Conochie's grade of severity = 0.583 and with the Curwin & Stanish tendon grading system = -0.573 Reliability: Test-retest: n=45 Pearson's r = 0.93. Group 1 Pearson's r = 0.98. Group 4 Interval → 7 days
Year of publication	Transcultural adaptation	Dimensions and structure	Population used for validation	Psychometric properties
2005	SWEDISH	Self-administered tool 8 items 3 domains: pain, function and activity	n=51 (19 female; 32 male); 43.1 (SD: 14.5) years	Content validity: translation and cultural adaptation of VISA-A and validity test Internal consistency: Cronbach's alpha=0.77 Criterion validity: Spearman rho with Stanish grading system= -0.68 Construct validity: Exploratory factor analysis: 2-factor solution (factor 1, items 1-6, pain/symptoms and second factor, physical activity (questions 7 and 8) Reliability: Test-retest n= 22; Pearson's r = 0.89 ICC= 0.89 Interval →7 days. Compared results of patients (n=51) with the results of the two-patient group (non- surgical

				n=45 and surgical n=14) in the original article
2008	ITALIAN	Self-administered tool 8 items 3 domains: pain, function and activity	N=50 male; 26.4 years	Content validity: translation and adaptation to English VISA-A and perform reliability and validity evaluation of VISA-A-I version. Reliability: Test-retest: Cohen's Kappa 0.80 (0.70-0.86) Interval → 30 minutes
2009	GERMAN	Self-administered tool 8 items 3 domains: pain, function and activity	N=109 Group 1: n= 15 (preoperative Achilles tendinopathy); 47.8 (SD: 11.4) years Group 2: n= 15 (patients with Achilles tendinopathy conservatively treated); (44.6 (SD:14) years Group 3: n= 48 (students without Achilles tendon complaints); 21 (SD: 3.9)years Group 4: n=31 (runners non injured but active); 39.3 (SD:11.7) years	Content validity: cross-culturally adapted into German according to the 'guidelines for the process of cross-cultural adaptation of self-report measures' and analysis of reliability and validity. Internal consistency: Cronbach's alpha 0.74 Criterion validity: Curwin & Stanish tendon grading system = -0.953 Construct validity: Spearman r with Percy & Conochie's grade of severity = 0.953 Reliability: Test-retest n=15 ICC= 0.87, interval → 7 days
2011	TURKISH	Self-administered tool 8 items 3 domains: pain, function and activity	N=110 (78 male; 32 female) Group 1: n=55 (patients with Achilles tendinopathy); 40.9 (SD: 6.2) years Group 2: n=55 healthy; 38.5 (SD: 7.2) years	Content validity: cross-cultural adaptation using the guidelines proposed by Beaton. Internal consistency: Cronbach's alpha 0.66 Criterion validity: Spearman's r with the Stanish et al. tendon grading system = -0.863; with the Grimby et al. physical activity grading system = 0.743 Reliability: Test-retest n= 26 Pearson's r = 0.992 Split half reliability coefficient = 0.77
2015	DANISH	Self-administered tool	n=146 (72 male; 74 female)	Content validity: cross-cultural adaptation using the

		8 items 3 domains: pain, function and activity	Group 1: n=71 (patients with AT); 42.13 (SD: 13.0) years Group 2: n=75 (healthy); 39.13 (SD: 13.0) years	guidelines proposed. Internal consistency: Cronbach's alpha= 0.73 Reliability: Test-retest group 1 patients Pearson's r= 0.80, ICC 0.79; group 2 Pearson's r= 0.98, ICC= 0.97.
2016	FRENCH	Self-administered tool 8 items 3 domains: pain, function and activity	n=116 (32 female;84 male); 34.1 years Group 1: n=31 (Pathological subjects); 45.2 (SD: 15.2) years Group 2: n=63 ("At-risk" subjects); 29.1 (SD: 11.0) years Group 3: n=22 (Healthy subjects); 30.1 (SD: 10.7) years	Content validity: cross-cultural adaptation using the guidelines proposed. Internal consistency: Cronbach's alpha= 0.90 Reliability: test-retest ICC= 0.99
2017	SPANISH	Self-administered tool 8 items 3 domains: pain, function and activity	n=210 (62 female; 149 male) Group 1: n=70 (Pathological subjects dx with ultrasound); 33.9 (SD: 12.0) years Group 2: n=70 ("At-risk" subjects); 24.1 (SD: 4.2) years Group 3: n=70 (Healthy subjects); 20.3 (SD: 2.8) years	Content validity: cross-cultural adaptation using the guidelines proposed. Internal consistency: Cronbach's alpha= 0.89 Construct validity: CFA unidimensional structure Agreement: limits of agreement ranging from 4.64 to -5.90 points, mean difference -0.63 (SD 1.96) Reliability: Test-retest ICC= 0.993 3-5 days Responsiveness. SRM 1.923

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	2018	DUTCH	Self-administered tool 8 items 3 domains: pain, function and activity	n=104 (49 female; 55 male) Study; n=93 Group 1: n=71 (Athletes); 36.2 (SD:13.9) years Group 2: n=22 (Non-athletes); 22.0 (SD: 15.7) years	Content validity: cross-cultural adaptation using the guidelines proposed. Internal consistency: Cronbach's alpha= 0.78 Reliability: test-retest ICC= 0.97 Responsiveness: varies by up to 12 points No floor/ceiling effect observed, 1% of subjects scored 0 point, 0% scored 100 points. Interpretability: Athletes mean 52.4 (SD: 19.7) ; Non-athletes mean 22.0 (SD: 15.7)
19 20 21 22 23 24 25 26 27 28	2018	CHILEAN-SPANISH	Self-administered tool 8 items 3 domains: pain, function and activity	N=60 (23 Female; 37 Male) Group 1: n= 20 (healthy subjects); age 48 years Group 2: n= 20 (recently diagnosed Achilles tendinopathy); age 41 years Group 3: n= 20 (severe Achilles tendinopathy); age 43 years	Content validity: cross-cultural adaptation using the guidelines proposed. Reliability: test-retest at 1 hour and 1 week.
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	2018	BRAZILIAN-PORTUGUESE	Self-administered tool 8 items 3 domains: pain, function and activity	N=106 39 Female 67 Male Group 1: n= 17 (physically active); 22.6 (SD: 4.2) years Group 2: n= 50 (non-athletic);	Content validity: cross-cultural adaptation using the guidelines proposed. Internal consistency: Cronbach's alpha= 0.79 Criterion validity: Pearson's correlation coefficient with LEFS (0.73) Construct validity: 100% results in accordance with hypotheses

			24.0 (SD: 4.7)years Group 3: n= 39 (healthy individuals); 31.2 (SD: 10.2) years	Reliability: test-retest ICC= 0.84 Responsiveness: SDC 0.92 < MIC 1.5 Floor/ceiling effect: 0%
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2001. The VISA-A questionnaire: a valid and reliable index of the clinical severity of Achilles tendinopathy.

2005. Cross-cultural adaption of the VISA-A questionnaire, an index of clinical severity for patients with Achilles tendinopathy, with reliability, validity and structure evaluations.

2008. Italian translation of the VISA-A score for tendinopathy of the main body of the Achilles tendon.

2009. Cross-cultural adaptation and validation of the VISA-A questionnaire for German-speaking Achilles tendinopathy patients.

2011. Validation of the VISA-A questionnaire for Turkish language: the VISA-A-Tr study

2015. Danish VISA-A questionnaire with validation and reliability testing for Danish-speaking Achilles tendinopathy patients.

2016. Validity and reliability of the French translation of the VISA-A questionnaire for Achilles tendinopathy.

2017. Cross-cultural adaptation of the Victorian Institute of Sports Assessment-Achilles (VISA-A) questionnaire for Spanish athletes with Achilles tendinopathy.

2018. Dutch version of the Victorian Institute of Sports Assessment-Achilles questionnaire for Achilles tendinopathy: Reliability, validity and applicability to non-athletes.

2018. Cross-cultural adaptation and validation of the VISA-A questionnaire for Chilean Spanish-speaking patients

2018. Cross-cultural adaptation and measurement properties of the Brazilian Portuguese version of the Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire

N: number of patients; SD: standard deviation; ICC: Intraclass correlation coefficient; CFA: confirmatory factorial analysis; SRM: standardised root mean; LEFS: lower extremity functional scale; SDC: smallest detectable change; MIC: minimal important change.

Table 3. Assessment of the measurement properties of the questionnaires

	Content validity	Internal consistency	Criterion validity	Construct validity	Reproducibility agreement	Reproducibility reliability	Responsiveness	Floor/ceiling effect	Interpretability
VISA-A ENGLISH (2001)	+	0	-	?	0	+	0	0	?
VISA-A SWEDISH (2005)	+	+	-	+	0	+	0	0	?
VISA-A ITALIAN (2008)	?	0	0	0	0	+	0	0	0
VISA-A GERMAN (2009)	+	+	+	?	0	+	0	0	?
VISA-A TURKISH (2011)	?	-	+	?	0	+	0	0	?
VISA-A DANISH (2015)	+	+	0	+	0	+	0	0	?
VISA-A FRENCH (2016)	+	+	-	+	0	+	0	?	?
VISA-A	+	+	-	+	+	+	+	+	+

SPANISH (2017)									
VISA-A DUTCH (2018)	+	+	-	0	?	+	?	+	?
VISA-A CHILEAN- SPANISH (2018)	+	0	0	?	?	?	0	0	?
VISA-A BRAZILIAN- PORTUGUESE (2018)	+	+	+	+	?	+	+	+	?

Rating: + Positive; ? Indeterminate; - Negative; 0 No information available.

2001. The VISA-A questionnaire: a valid and reliable index of the clinical severity of Achilles Tendinopathy.

2005. Cross-cultural adaptation of the VISA-A questionnaire, an index of clinical severity for patients with Achilles Tendinopathy, with reliability, validity and structure evaluations.

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2018. Dutch version of the Victorian Institute of Sports Assessment-Achilles questionnaire for Achilles Tendinopathy: Reliability, validity and applicability to non-athletes

2018. Cross-cultural adaptation and validation of the VISA-A questionnaire for Chilean Spanish-speaking patients

2018. Cross-cultural Adaptation and Measurement Properties of the Brazilian Portuguese Version of the Victorian Institute of Sport Assessment-Achilles (VISA-A) Questionnaire

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Table 4. Summary of COSMIN ratings

	Structural validity	Internal consistency	Reliability	Measurement error	Hypotheses testing for construct validity	Cross-cultural validity	Criterion validity	Responsiveness	Final assessment
VISA-A ENGLISH (2001)	-	?	+	?	?	-	-	?	1
VISA-A SWEDISH (2005)	-	+	+	?	?	+	-	?	3
VISA-A ITALIAN (2008)	-	?	+	?	?	+	?	?	2
VISA-A GERMAN (2009)	-	+	+	?	?	?	+	?	3
VISA-A TURKISH (2011)	-	-	?	?	?	+	+	?	2
VISA-A DANISH (2015)	-	+	+	?	?	+	?	?	3
VISA-A FRENCH (2016)	-	+	+	?	?	+	?	?	3
VISA-A SPANISH	+	+	+	+	+	+	?	+	7

(2017)									
VISA-A DUTCH (2018)	-	+	+	+	+	+	?	-	5
VISA-A CHILEAN- SPANISH (2018)	-	?	?	?	?	+	0	0	1
VISA-A BRAZILIAN- PORTUGUESE (2018)	-	+	+	+	+	+	+	+	7

Rating: [“+” = sufficient, “-” = insufficient, “?” = indeterminate]

VISA-A. The Victorian Institute of Sports Assessment – Achilles.

- 2001. The VISA-A questionnaire: a valid and reliable index of the clinical severity of Achilles tendinopathy.
- 2005. Cross-cultural adaptation of the VISA-A questionnaire, an index of clinical severity for patients with Achilles tendinopathy, with reliability, validity and structure evaluations.
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4 2018. Dutch version of the Victorian Institute of Sports Assessment-Achilles questionnaire for Achilles tendinopathy: Reliability, validity and applicability to non-athletes

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6 2018. Cross-cultural adaptation and validation of the VISA-A questionnaire for Chilean Spanish-speaking patients

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8 2018. Cross-cultural adaptation and measurement properties of the Brazilian Portuguese version of the Victorian Institute of Sport Assessment-Achilles (VISA-A)
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