

# Cross-Cultural Adaptation of The Visa-P Questionnaire for Danish-Speaking Patients with Patella Tendinopathy

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## SUMMARY

**Introduction.** Victorian Institute of Sports Assessment-Patella (VISA-P) questionnaire is a both valid and reliable Patient-Reported Outcome Measure (PROM) assessing the severity of Patella Tendinopathy (PT). The VISA-P questionnaire exists in several languages, but not in Danish.

**Objective.** To translate and cross-culturally adapt the original VISA-P questionnaire for a Danish-speaking PT population and verify its psychometric properties to produce a validated Danish version of the VISA-P questionnaire.

**Methods.** Translation and cross-cultural adaptation was performed according to international guidelines. Translation, synthesis, reverse translation, original authors' approval and pretesting were performed. Psychometric properties of VISA-P-DK were assessed on PT patients (n=86), healthy individuals (n=69) and on a PT patient group at 3-months follow-up.

**Results.** Mean VISA-P-DK score in PT patients was 54 (95% Confidence Interval (CI) 50-57), significantly lower than the healthy control score of 99 (95% CI 98-100). Test-retest reliability of the VISA-P-DK was good ( $r=0.87$  and  $ICC=0.88$ ). Internal consistency was also good (Cronbach's  $\alpha=0.83$ ). Correlations between the VISA-P-DK and scales measuring physical health by SF-36 (criterion validity) were in 2/3 cases moderate to good. No significant difference was found when comparing the PT group in the original study. Responsiveness showed a significant difference ( $p < 0.05$ ) between baseline score and 3-months follow-up score.

**Conclusions.** VISA-P-DK is a valid and reliable tool for measuring and monitoring of Danish-speaking PT patients. VISA-P-DK is easily applicable in the clinical setting, and its comparability with other VISA-P questionnaires makes it a useful tool in research.

## KEY WORDS

*Tendon injury; exercise induced pain; joint; patella tendinopathy; sports medicine; jumpers knee.*

## INTRODUCTION

Patella Tendinopathy (PT) or jumper's knee is a common overuse injury in especially sports containing running and jumping (1). PT is present in both elite (14,2%) and non-elite athletes (8,5%), with elite volleyball players having the highest prevalence (44,6%) (2, 3). PT is invalidating and affects both athlete performance level and participation (4). Furthermore, the work life of nonprofessional athletes may be affected (5, 6). So far, no standardized patient-reported outcome measure to assess PT exists in Danish.

PT diagnosis is based on: 1) pain localized to the inferior pole of the patella, 2) load-related pain that increases as the demand on the knee extensors increases (2, 7-10). Risk factors for developing PT include male gender, hours of training, previous knee injury, as well as decreased hamstring flexibility (11). Ultrasound and MRI are often used when diagnosing PT (7, 9, 12, 13). However imaging does not correlate with reported PT symptoms (13).

Patella Tendinopathy (PT) is a both well-known and invalidating sports injury worldwide. Etiology of PT is still discussed, making treatment a challenge for clinicians (4, 14). Treatment options include: platelet-rich plasma injections, hyaluronic acid injections and shock wave therapy (14-16). PT diagnosis is primarily based on clinical examination. However, a patient-centered approach is considered more essential for diagnosing and monitoring. At present physicians only have one disease specific instrument (VISA-P) to determine PT severity and to monitor treatment systematically.

VISA-P17 is a disease specific PROM for measuring physical disability caused by PT. VISA-P does therefore measure experienced performance of the musculoskeletal system in the knee region. It is often used as an outcome measure when monitoring treatment or when studying PT (2, 7, 8). VISA-P is based on an inverted Numeric Rating Scale (NRS). It consists of 8 questions, resulting in a score ranging from 0 (total disability) to 100 points (no recorded problems). VISA-P is sensitive to changes in symptoms and is easily understood by patients, giving relevant answers to clinicians (18). In order to use VISA-P for non-English speaking patients, a translation and cultural adaptation of the questionnaire with a validity and reliability testing is needed. VISA-P has successfully been translated into at least 10 other languages. All translations are satisfactory cross-cultural adaptations (18-27). Other Victorian Institute of Sport Assessment questionnaires have previously been successfully translated into Danish, e.g. VISA-A (28). VISA-A-DK is now an international standardized tool for measuring Danish-speaking Achilles Tendinopathy (AT) patients. Clinicians are able to transfer severity of AT directly when

comparing subjects and/or studies from different countries. Standardized examination makes it easier to produce international consensus on treatment strategies. However, a translation of an existing questionnaire leaves little room for improvement, and content validity will be consistent through all translations.

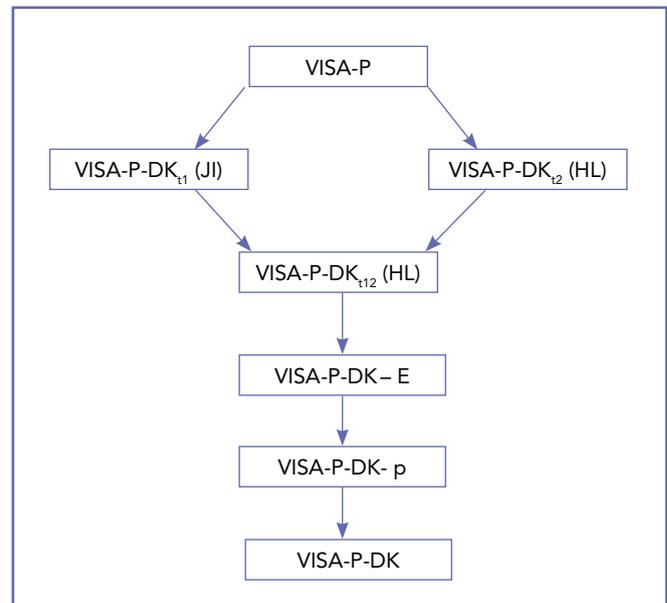
The aim of this study was to develop a Danish version of VISA-P, VISA-P-DK (see **Appendix 1**). Validation and reliability testing of the new questionnaire was carried out. VISA-P-DK has the advantage of being easily applicable in all clinical settings and has been long needed in the assessment of Danish-speaking PT patients, both in diagnostics and in follow-up.

## METHODS

### Translation

The cross-cultural adaptation was made in accordance with the guidelines set for self-reported questionnaires by Beaton *et al.* (2000) (29). The following 5 steps were performed (**figure 1**).

1. Translation: two independent Danish translations were made from the original English version of VISA-P questionnaire by two bilingual translators (JI + HL). Both translators had Danish as their first language and English as their second. Any challenges in translation were noted.
2. Synthesis: to produce one Danish version the two translations were then compared and synthesized. Any challeng-



**Figure 1.** Synthesis of VISA-P-DK.

- es in translation were discussed and agreed upon. The result was VISA-P-DKt (12).
3. Reverse translation: the synthesized Danish version VISA-P-DKt12 was then translated back into English. This was carried out by a certified Danish-English translator with no medical background, who was to be naive to the original VISA-P and the purpose of the study. Any challenges were noted by the translator. The result was VISA-P-DK-E.
  4. Review: to ensure the new Danish questionnaire VISA-P-DKt12 was compatible to the original VISA-P (13), the translation of VISA-P-DK-E was reviewed and approved by the main authors of VISA-P (Visentini and Wark) (13). The resulting pilot version, VISA-P-DK-p, was used in the pretesting.
  5. Pretesting: VISA-P-DK-p was tested on five healthy individuals aged 18-40 years, recruited from Hvidovre Hospital, Denmark. The translators interviewed all five individuals via e-mail. This test resulted in an inversion of question 2-6. The remodeling of the questionnaire was also sent to the main authors of the original article and accepted. The result was the Danish version of VISA-P: VISA-P-DK. VISA-P-DK was then validated in the following study.

When translating VISA-P, the time intervals given in question 8 were (in minutes) changed from (0, 1-5, 6-10, 11-15, > 15) to (0, 1-10, 11-20, 21-30, > 30). These changes were made because the authors believed that the difference of an athlete being able to participate 30 or 16 minutes, represented too big a difference in the severity of PT to be disregarded. The original authors approved these changes even though being different from the other language versions of the VISA-P questionnaire.

### Patient recruitment and ethics

Patients were recruited through physicians at the University Hospital Aarhus, Denmark and through a private Physical Therapy Clinic in Dronninglund, Denmark. All participants gave informed oral consent to participate in the adaptation study. The legislation of processing personal information was carried out in accordance with the guidelines of the Danish Data Protection Agency, and we provided a binding description stating the use of personal information prior to study start. The study is compliant to the ethical and scientific standard discussed in Padulo *et al.* (2018) (30).

### Sample size and participants

To obtain a power of 90% (two-sided 5% level of significance) a minimum of 31 subjects in the two groups was

required. VISA-P-DK was tested in 2 groups: 1) a group of athletes diagnosed with PT and 2) a control group consisting of healthy athletes (n=69). A PT subgroup also completed a SF-36 questionnaire (31, 32). PT patients were clinically diagnosed. The diagnosis was supported by ultrasound (US) (8). Currently or prior to injury, all subjects participated in sports at least three times a week, were > 16 years of age, understood the purpose of the study, and had given informed oral consent. If a participant was younger than 18 years, the parents were also asked for consent.

### Statistics

Data processing was made in Excel and SPSS 25. Data were presented with a mean, standard deviation (SD) and a 95% Confidence Interval (CI 95%). Since the groups in this study were small, Central Limited Theorem (CLT) was applied (33). The Kolmogorov-Smirnov test was made to test all groups for normal distribution. Significance level was set to  $p < 0.05$ . Since VISA-P-DK is based on a numeric scale where symptoms are converted into a numerical value, all data in the study are considered non-parametric.

### Reliability

To assess the reliability of VISA-P-DK, internal consistency, test-retest reliability and measurement error were tested (34, 35). To assess internal consistency Cronbach's *alpha* was calculated (35). Test-retest was performed on 33 PT patients who completed the questionnaire twice: 1) at their first visit to the physician, and 2) 2-5 days later. Agreement and correlation were measured using Intraclass Correlation Coefficient (ICC) model (2.1) (36) and Spearman's rank correlation (*rho*). To note any significant difference between the two days, Wilcoxon signed rank Test was performed. The Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC) were calculated (37, 38). MDC was calculated based on a 95% confidence interval. To further demonstrate and visualize the reliability, a Bland & Altman plot was constructed.

### Validity

To assess Validity, different aspects of validity were explored: Construct, Convergent, and Criterion validity (34, 35). Construct validity was measured comparing the control group with the PT group and the 3-months follow-up group (35). It was expected that the PT group would have the lowest score, the 3-month follow-up group a higher score, and the control group the highest. Since the groups were nonpaired, the Mann-Whitney U Test was applied (39).

Convergent validity was tested by a subgroup completing both VISA-P-DK and the validated SF-36. The correlation between the subscales examining physical health in SF-36 and VISA-P-DK score was calculated using Spearman's *rho*. As no golden standard for the assessment of PT in Denmark exists, criterion validity was tested comparing the scores of VISA-P-DK to the PT patient groups in the original article (17) (n=14) (34). Since only mean (55) and SD (12) were available, a two-sample t-Test was used to compare the two scores. Responsiveness was tested by having a subgroup complete the questionnaire after 3 months of treatment (35). To assess if there was a significant difference in the two completions of the questionnaire, the Wilcoxon signed rank test was applied. PT patients followed treatment decided by their physicians independently of their participation in the study.

The results were examined to see if floor or ceiling effects were present.

## RESULTS

The Danish VISA-P questionnaire, VISA-P-DK is shown in **table I**. No problems understanding the questionnaire were reported. The re-translated version in English was approved by the original authors of VISA-P (13), and the cross-cultural adaptation of VISA-P for Danish-speaking PT patients was accepted.

### VISA-P-DK Test population

86 PT Patients and 69 healthy controls were tested. The two groups were comparable regarding age, but not regarding

gender. One subject received treatment in between testing and re-testing of the questionnaire. This subject was therefore removed from the re-test subgroup. Three PT patients only completed the VISA-P-DK after three months of treatment. These subjects were excluded when comparing the two groups. Applying Kolmogorov-Smirnov showed that both the PT patient group and subgroups followed a normal distribution. The control group did not follow a normal distribution.

### Reliability

Test-retest reliability is summarized in **table II**. Total VISA-P-DK score showed good internal consistency and correlation with and ICC score of 0.88 and Spearman's *rho* 0.87, (an ICC score higher than 0,75 is considered good or excellent) (36). 5 of the questions showed moderate reliability ( $0.5 < ICC < 0.75$ ). Total score MDC% was 12%. An MDC% of 30% is considered reasonable and 10% is considered excellent (37). When evaluating each question individually all had an MDC% higher than 30%. There was no significant difference in the data obtained on the two test days ( $p > 0.05$ ).

Internal consistency of the 8 VISA-P-DK questions was 0.83 (Cronbachs *alpha* (40)). The Bland & Altman plot (**figure 2**) shows no indication of bias.

### Validity

#### Construct validity

PT patients (n=86) had a mean VISA-P-DK score of 54 (95% CI 50,6-57,6). Healthy Controls (n=69) had a mean VISA-P-DK score of 99,1 (95% CI 98,2-100) (**table I**).

**Table I.** Descriptive data.

	n	Age (years) Mean, SD (95% CI)	Baseline VISA-P-DK score Mean, SD (95% CI)	Retest or follow-up VISA-P-DK score Mean, SD (95% CI)
PT patients	86 M 60 F 26	28.8 (26.6-31)	54.1, 16.5 (50.6-57.6) 54 (49,9-58,1) 54.2 (47,5-61)	
PT patients re-test group	33 M 23 F 10	26.5 (23.4-29.7)	52.8, 14.9 (47.8-57.9) 53.3 (48-58.6) 51.7 (39.7-63.7)	54.3, 15.2 (49.1-59.5) 54.6 (48.9-60.4) 53.5 (42.1-64.9)
PT patients 3 months follow up	33 M 21 F 12	26.7 (23.9-29.5)	54.1, 15.9 (48.7-59.5) 53.5 (47.1-59.7) 55.2 (44.6-65.7)	70.5, 17.4 (64.6-76.5) 68 (61.2-74.8) 75 (63.8-86.2)
Healthy controls	69 M 17 F 52	29.1 (25.9-32.2)	99.1 (98.2-100) 100 (100-100) 98.77 (98.6-99.9)	

M=Male subjects, F=Female subjects, CI=Confidence Interval, SD=Standard Deviation.

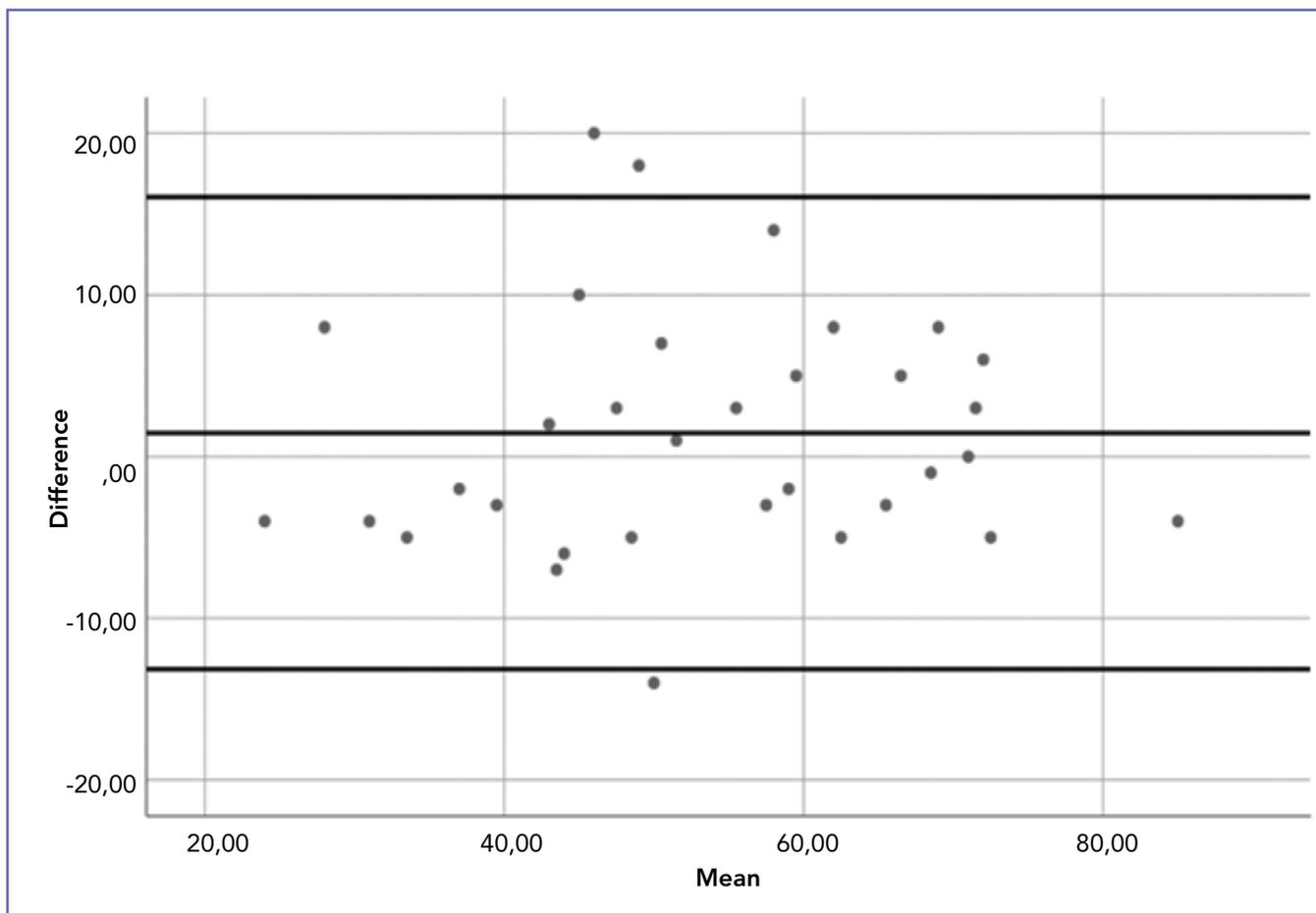
**Table II.** Test-retest reliability.

	Spearman's rho	ICC (95% CI)	Wilcoxon Z score (P)	SEM	MDC95	SEM%	MDC%
Q1	0.75	0.76 (0.57-0.88)	-0.04 (0.97)	1.8	3.8	28.5%	42.9%
Q2	0.56	0.64 (0.38-0.8)	-0.28 (0.78)	1.4	3.3	19.1%	75.5%
Q3	0.59	0.55 (0.25-0.75)	-0.39 (0.7)	1.8	3.7	22.2%	66.9%
Q4	0.6	0.53 (0.23-0.73)	-1.9 (0.06)	2.1	4	35.9%	68.2%
Q5	0.8	0.79 (0.62-0.89)	-1.43 (0.15)	1.4	3.3	29%	68.8%
Q6	0.68	0.69 (0.46-0.83)	-0.77 (0.45)	1.7	3.6	31.2%	46.4%
Q7	0.69	0.7 (0.48-0.84)	-1.73 (0.084)	1.3	3.1	30.6%	44.3%
Q8	0.86	0.9 (0.81-0.95)	-1.12 (0.26)	2.8	4.7	26%	58.1%
Total	0.87	0.88 (0.77-0.94)	-0.85 (0.39)	5.4	6.4	10.1%	12.1%

ICC=Intraclass Corellation Coefficient. 95% CI =95% Confidence Interval.

SEM=Standard Error of Measurement. MDC =Minimal Detectable Change.

All ICC values had was statistically significant  $p < 0.05$ .



**Figure 2.** Bland & Altman plot from test-retest subgroup.  
Mean: 1.5, 95% CI: -13.1-16.1.

The difference was tested with the Mann Whitney U Test and was statistically significant with a Z value of -11 ( $p < 0.00001$ ).

#### Criterion validity

When comparing PT patients VISA-P-DK score (mean 54, SD 16.5) with the PT patients VISA-P score (mean 55, SD 12) from the original article (17) with a two sample t-Test, no significant difference was found ( $p < 0.05$ ).

#### Convergent validity

When comparing the PT patient subgroup SF-36 scale scores with VISA-P-DK score Spearman's  $\rho$  was: Physical Function (PF) 0.6 ( $p < 0.05$ ), Role Function-physical (RF) 0.28 ( $p > 0.05$ ) and Bodily Pain (BP) 0.5 ( $p < 0.05$ ). Correlation based on the score is considered low  $< 0.3$ , moderate 0.3-0.6 and high  $< 0.6$  (18).

#### Responsiveness

After 3 months of treatment a PT patient subgroup ( $n=33$ ) completed the questionnaire once more. The subgroup showed at baseline a Mean VISA-P-DK score of 54,1 (95% CI 48,7-59,5) and a mean score of 70,6 (95% CI 64,6-76,5) after 3 months. This showed a significant rise in VISA-P-DK score following 3 months of treatment ( $p < 0.05$ ).

#### Floor or ceiling effects

Floor and ceiling effects are present when 15% of the test population scores either the lowest or highest possible score (41). No subjects obtained a maximum or a minimum VISA-P-DK score at baseline. This also applied to the retest group. Only one patient in the 3-months follow-up subgroup obtained a maximum score after 3 months of treatment. In the control group 94% (65 subjects) obtained a maximum score. The maximum score found in the control group was expected, since they were chosen as healthy.

## DISCUSSION

During pretesting of VISA-P-DK, problems understanding the inverted NRS score in question 2-6 resulted in a reversion of the scoring system regarding these 5 questions. The final VISA-P-DK questionnaire was intuitive, easily comprehended by our test subjects and accepted by the authors of the original article (17). The PT patient VISA-P-DK score was similar to the PT patient scores in the other versions of the VISA-P (**table III**) (18-27).

Test-retest reliability of the VISA-P-DK questionnaire was good (0.88 ICC) and consistent with ICC's of the other

translations (**table III**). When looking at each question separately, poor reliability (ICC  $< 0.75$ ) in at least 5 of the questions was found. In other translations of the VISA-P questionnaire, reliability of the individual questions was much higher. When comparing our version to the ones in the other VISA-P studies, the questionnaires remain consistent, but the setup were different. Therefore, a direct comparison cannot be made. The authors believe that a test-retest interval of 2-5 days and retesting only symptomatic patients is the best solution in reliability testing. Other studies have used shorter intervals (18, 25). This makes it easier for subjects to recall their previous response. Some studies only tested healthy subjects (19-22, 24), and some both symptomatic and healthy subjects (27). Healthy subjects are not expected to show any significant changes in VISA-P score as seen in symptomatic patients. In VISA-P-DK the MDC of each single question score was considered poor (MDC  $> 30\%$ ) (37). An MDC% of the total VISA-P-DK score of 12% indicates that the questionnaire is an acceptable measure of PT impact on patient life. When applying VISA-P-DK in the clinical setting the authors therefore suggest that only total VISA-P score is considered. Supporting this suggestion, internal consistency of 0.83 (Cronbachs  $\alpha$ ) indicated a good correlation between the questions. This shows that no question should be excluded, being in line with the other VISA-P translations (**table III**) (18-27).

When testing construct validity, a significant difference was shown between all three groups. The untreated PT group had the lowest, the 3-month follow-up the median and the control group the highest VISA-P-DK score. This indicates good construct validity. No significant difference was found when comparing PT-patients scores from VISA-P-DK to the scores from PT patients in the original VISA-P study. This indicated good criterion validity. The 3-month follow-up group had a significantly higher VISA-P-DK score after treatment. This shows that VISA-P-DK can detect a progress in PT severity, and responsiveness was considered good. Good responsiveness has been shown in only one other study (26).

The decision to use SF-36 to measure convergent validity, and not for example KOOS (42), was based on it being more widely used, as seen for the other adaptations of VISA-P. Only 3 of 8 subscales in SF-36 explores physical health. A guideline scoring and interpretation of each of the 8 scales individually was used, making the risk of bias small (43). The PF scale score and the BP scale score had a moderate and strong correlation to the VISA-P-DK score, indicating strong convergent validity. There was no significant correlation between the RF scale score and VISA-P-DK score. The explanation could be that the RF scale score had a high floor or ceiling effect with 50% scoring 0 or 100 points on the transformed scale score.

**Table III.** Comparison of VISA-P adaptations.

	PT patients VISA-P score	Healthy group VISA-P score	ICC	Cronbachs $\alpha$
Italian version	44 (n=25)			0.78 (kappa)
Swedish version	48 $\pm$ 20 (n=17)	83 $\pm$ 13 (n=17)	0.97	0.83
French version	53 $\pm$ 17 (n=28)	99 $\pm$ 2 (n=22)	0.99	0.9
Danish version	54 $\pm$ 17 (n=86)	99 $\pm$ 4 (n=69)	0.88	0.83
Original-English version	55 $\pm$ 12 (n=14)	95 $\pm$ 8 (n=26)	0.99 (Pearsons)	
Spanish version	56 $\pm$ 13 (n=40)	96 $\pm$ 2 (n=40)	0.99	0.83
Dutch version	58 $\pm$ 19 (n=20)	95 $\pm$ 9 (n=18)	0.74	0.73
Brazilian-Portuguese version	59 $\pm$ 18 (n=52)		0.91	0.76
Turkish version	59 $\pm$ 12 (n=34)	94 $\pm$ 9 (n=29)	0.96	0.79
German version	62 $\pm$ 13 (n=23)	95 $\pm$ 6 (n=52)	0.88	0.88
Korean version	68 $\pm$ 16 (n=23)	93 $\pm$ 9 (n=5)	0.97	0.8

Mean score  $\pm$  SD.  
ICC=Intraclass Correlation Coefficient.

All in all, the translation, adaptation, validation and psychometric properties of this study show that VISA-P-DK is a useful and reliable tool when assessing severity and monitoring PT in Danish-speaking PT patients.

The development of the Danish version of the Patient Reported Outcome Measure VISA-P will in future be able to help Danish physicians when treating PT and when carrying out further research on PT. The validation of the Danish version of VISA-P will also allow for comparing VISA-P data from Danish populations with populations from other language groups where VISA-P is validated as a tool.

### Future considerations

PROMs provide a more patient-centered assessment by not only assessing disease specific activity but also life impact of the disease. As a result, the role of PROM's in the measurement of health outcomes has become increasingly important. PROMs have developed from being generic (*e.g.* SF-36) to disease specific (*e.g.* VISA-P (17), VISA-A-DK (28)). PROMs are expected to play a role in patient-centered health care. Now VISA-P-DK can contribute as a disease specific questionnaire. For a better comparison to other versions, a more consistent setup is asked for when reliability testing.

To further develop VISA-P-DK a Rasch analysis would give an even better perspective of the use of this tool. This would require a larger PT patient group. A Rasch analysis would add a weighing of the questions and could therefore lead to an even more precise VISA-P-DK.

### Perspective

VISA-P-DK is a valid and reliable tool for assessing PT and should preferably be completed by the patient alone and prior to discussing patient condition with the physician. VISA-P now exists in 11 different languages including Danish and is therefore useful in cross-cultural comparison of PT.

### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

### REFERENCES

1. Bode G, Hammer T, Karvouniaris N, *et al.* Patellar tendinopathy in young elite soccer- clinical and sonographical analysis of a German elite soccer academy. *BMC Musculoskelet Disord* 2017;8;18(1):344.
2. Lian ØB, Engebretsen L, Bahr R. Prevalence of Jumper 's Knee Among Elite Athletes From Different Sports A Cross-sectional Study. *Am J Sports Med* 2005;33(4):561-7.
3. Zwerver J, Bredeweg SW, Van Den Akker-Scheek I. Prevalence of jumper's knee among nonelite athletes from different sports: A cross-sectional survey. *Am J Sports Med* 2011;39(9):1984-8.
4. Kaux JF, Croisier JL, Libertiaux V. Isokinetic strength profile of subjects with proximal patellar tendinopathy. *MLTJ* 2019;9(2):210-216.
5. De Vries AJ, Koolhaas W, Zwerver J, *et al.* The impact of patellar tendinopathy on sports and work performance in active athletes. *Res Sport Med* 2017;25(3):253-265.
6. Cook JL, Rio E, Purdam CR, Docking SI. Revisiting the continuum model of tendon pathology: What is its merit in clinical practice and research? *Br J Sports Med* 2016;50(19):1187-91.
7. Rudavsky A, Cook J. Physiotherapy management of patellar tendinopathy (jumper's knee). *J Physiother* 2014;60(3):122-9.

8. Malliaras P, Cook J, Purdam C, Rio E. Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations. *J Orthop Sport Phys Ther* 2015;45(11):887-98.
9. Maffulli N, Oliva F, Loppini M, Aicale R, Spiezia F, King JB. The Royal London Hospital test for the clinical diagnosis of patellar tendinopathy. *MLTJ* 2017;18;7(2):315-322.
10. Khan KM. Patellar tendinopathy: Some aspects of basic science and clinical management. *Br J Sports Med* 1998;32(4):346-55.
11. Morton S, Williams S, Valle X, Diaz-Cueli D, Malliaras P, Morrissey D. Patellar Tendinopathy and Potential Risk Factors: An International Database of Cases and Controls. *Clin J Sport Med* 2017;27(5):468-474.
12. Maffulli N, Testa V, Capasso G, *et al.* Similar histopathological picture in males with Achilles and patellar tendinopathy. *Med Sci Sports Exerc* 2004;36(9):1470-5.
13. Khan KM, Bonar F, Desmond PM, *et al.* Patellar tendinosis (jumper's knee): findings at histopathologic examination, US, and MR imaging. Victorian Institute of Sport Tendon Study Group. *Radiology* 1996;200(3):821-7.
14. Kaux JF, Bornheim S, Dardenne N, *et al.* Comparison between platelet-rich plasma injections and hyaluronic acid injections in the treatment of patellar tendinopathies: A randomized trial. *MLTJ* 2019;9(3):322-327.
15. Frizziero A, Oliva F, Vittadini F, *et al.* Efficacy of ultrasound-guided hyaluronic acid injections in achilles and patellar tendinopathies: A prospective multicentric clinical trial. *MLTJ* 2019;9(3):305-313.
16. Maffulli G, Iuliano E, Padulo J, Furia J, Rompe J, Maffulli N. Extracorporeal shock wave therapy in the treatment of patellar tendinopathy: The ASSERT database. *MLTJ* 2018;8(3):437-443.
17. Visentini PJ, Khan KM, Cook JL, Kiss ZS, Harcourt PR, Wark JD. The VISA score: An index of severity of symptoms in patients with jumper's knee (Patellar Tendinosis). *J Sci Med Sport* 1998;1(1):22-8.
18. Kaux J-F, Delvaux F, Oppong-Kyei J, *et al.* Cross-cultural Adaptation and Validation of the Victorian Institute of Sport Assessment-Patella Questionnaire for French-Speaking Patients With Patellar Tendinopathy. *J Orthop Sport Phys Ther* 2016;46(5):384-90.
19. Lohrer H, Nauck T. Cross-cultural Adaptation and Validation of the VISA-P Questionnaire for German-Speaking Patients With Patellar Tendinopathy. *J Orthop Sport Phys Ther* 2011;41(3):180-190.
20. Korakakis V, Patsiaouras A, Malliaropoulos N. Cross-cultural adaptation of the VISA-P questionnaire for Greek-speaking patients with patellar tendinopathy. *Br J Sports Med* 2014;48(22):1647-52.
21. Çelebi MM, Köse SK, Akkaya Z, Zergeroglu AM. Cross-cultural adaptation of VISA-P score for patellar tendinopathy in Turkish population. *Springerplus* 2016;30;5(1):1453.
22. Frohm A, Saartok T, Edman G, Renström P. Psychometric properties of a Swedish translation of the VISA-P outcome score for patellar tendinopathy. *BMC Musculoskelet Disord* 2004;18;5:49.
23. Park BH, Seo JH, Ko MH, Park SH. Reliability and validity of the Korean version VISA-P questionnaire for patellar tendinopathy in adolescent elite volleyball athletes. *Ann Rehabil Med* 2013;37(5):698-705.
24. Hernandez-Sanchez S, Hidalgo MD, Gomez A. Cross-cultural Adaptation of VISA-P Score for Patellar Tendinopathy in Spanish Population. *J Orthop Sport Phys Ther* 2011;41(8):581-91.
25. Maffulli N, Longo UG, Testa V, Oliva F, Capasso G, Denaro V. VISA-P score for patellar tendinopathy in males: Adaptation to Italian. *Disabil Rehabil* 2008;30(20-22):1621-4.
26. Wageck BB, de Noronha MA, Lopes AD, da Cunha RA, Takahashi RH, Pena Costa LO. Cross-cultural Adaptation and Measurement Properties of the Brazilian Portuguese Version of the Victorian Institute of Sport Assessment-Patella (VISA-P) Scale. *J Orthop Sport Phys Ther* 2013;43(3):163-71.
27. Zwerver J, Kramer T, Van Den Akker-Scheek I. Validity and reliability of the Dutch translation of the VISA-P questionnaire for patellar tendinopathy. *BMC Musculoskelet Disord* 2009;10:102.
28. Iversen J V, Bartels EM, Jørgensen JE, *et al.* Danish VISA-A questionnaire with validation and reliability testing for Danish-speaking Achilles tendinopathy patients. *Scand J Med Sci Sport* 2016;26(12):1423-1427.
29. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures. *Spine (Phila Pa 1976)* 2000;25(24):3186-91.
30. Padulo J, Oliva F, Frizziero A, Maffulli N. Muscles, Ligaments and Tendons Journal - Basic principles and recommendations in clinical and field Science Research: 2018 update. *MLTJ* 2018;8(3):305-307.
31. Jenkinson C, Coulter A, Wright L. Short form 36 (SF36) health survey questionnaire: normative data for adults of working age. *BMJ* 1993;306(6890):1437-40.
32. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992;30(6):473-83.
33. Altman DG, Bland JM. Statistics notes: the normal distribution. *BMJ* 1995;310(6975):298.
34. Mokkink LB, Terwee CB, Knol DL, *et al.* The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: A clarification of its content. *BMC Med Res Methodol* 2010;10:22.
35. Mokkink LB, Terwee CB, Patrick DL, *et al.* The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. *J Clin Epidemiol* 2010;63(7):737-45.
36. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *J Chiropr Med* 2016;15(2):155-63.
37. Huang S-L, Hsieh C-L, Wu R-M, Tai C-H, Lin C-H, Lu W-S. Minimal Detectable Change of the Timed "Up & Go" Test and the Dynamic Gait Index in People With Parkinson Disease. *Phys Ther* 2011;91(1):114-21.
38. Luque-siles C, Gallego-izquierdo T, Jimenez-rejano JJ, Granados-de-la-orden S, Plaza-manzano G. Reliability and minimal detectable change of three functional tests: forward-lunge, step-up-over and sit-to-stand. *J Phys Ther Sci* 2016;28(12):3384-3389.
39. Divine G, Norton HJ, Hunt R, Dienemann J. Statistical grand rounds: a review of analysis and sample size calculation considerations for Wilcoxon tests. *Anesth Analg* 2013;117(3):699-710.

40. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ* 2011;2:53-55.
41. Lim CR, Harris K, Dawson J, Beard DJ, Fitzpatrick R, Price AJ. Floor and ceiling effects in the OHS: An analysis of the NHS PROMs data set. *BMJ Open* 2015;5(7):e007765.
42. Roos EM, Toksvig-Larsen S. Knee injury and Osteoarthritis Outcome Score (KOOS) - Validation and comparison to the WOMAC in total knee replacement. *Health Qual Life Outcomes* 2003;1:17.
43. Ware J, Snow K, Kosinski M, Gandek B. *SF-36 Health Survey Manual and Interpretation Guide*. Bost New Engl Med Cent 1993.

**APPENDIX 1.** The VISA-P-DK questionnaire.

Navn:	
CPR:	
Dato:	

**VISA-P-DK Spørgeskemaet: Vurdering af sværhedsgrad af 'springerknæ' (patellar tendinopati)**

I DETTE SPØRGESKEMA HENVISER ORDET SMERTE SPECIFIKT TIL SMERTE I KNÆSENEREGIONEN

1. Hvor mange minutter kan du sidde uden at få smerter?

0 min 

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

 100 min

POINT

2. Får du smerter ved at gå almindeligt ned ad trapper?

Ingen smerte 

10	9	8	7	6	5	4	3	2	1	0

 Stærk/svær smerte

POINT

3. Får du knæsmertes ved at strække knæet uden vægtbæring?

Ingen smerte 

10	9	8	7	6	5	4	3	2	1	0

 Stærk/svær smerte

POINT



8. Udfyld venligst A, B eller C i dette spørgsmål.

- Hvis du ikke har smerter under sport der belaster knæsenen, udfyld da venligst kun spørgsmål 8A.
- Hvis du har smerter under sport der belaster knæsenen, men det ikke stopper dig i at fuldføre aktiviteten, udfyld venligst kun 8B.
- Hvis du har smerter der hindrer dig i at fuldføre sport der belaster knæsenen, udfyld venligst kun 8C.

A. Hvis du ikke har smerter under sport der belaster knæsenen, i hvor lang tid kan du så træne/fortsætte?

0 min	0-10 min	11-20 min	21-30 min	> 30 min	POINT
<input style="width: 30px; height: 20px;" type="text" value="0"/>	<input style="width: 30px; height: 20px;" type="text" value="7"/>	<input style="width: 30px; height: 20px;" type="text" value="14"/>	<input style="width: 30px; height: 20px;" type="text" value="21"/>	<input style="width: 30px; height: 20px;" type="text" value="30"/>	<input style="width: 30px; height: 20px;" type="text"/>

ELLER

B. Hvis du har nogen smerte under sport der belaster knæsenen, men det ikke hindrer dig i at færdiggøre aktiviteten, hvor lang tid kan du så træne/fortsætte?

0 min	0-10 min	11-20 min	21-30 min	> 30 min	POINT
<input style="width: 30px; height: 20px;" type="text" value="0"/>	<input style="width: 30px; height: 20px;" type="text" value="4"/>	<input style="width: 30px; height: 20px;" type="text" value="10"/>	<input style="width: 30px; height: 20px;" type="text" value="14"/>	<input style="width: 30px; height: 20px;" type="text" value="20"/>	<input style="width: 30px; height: 20px;" type="text"/>

ELLER

C. Hvis du har smerter der hindrer dig i at færdiggøre sport der belaster knæsenen, hvor lang tid kan du så træne/fortsætte?

0 min	1-10 min	11-20 min	21-30 min	> 30 min	POINT
<input style="width: 30px; height: 20px;" type="text" value="0"/>	<input style="width: 30px; height: 20px;" type="text" value="2"/>	<input style="width: 30px; height: 20px;" type="text" value="5"/>	<input style="width: 30px; height: 20px;" type="text" value="7"/>	<input style="width: 30px; height: 20px;" type="text" value="10"/>	<input style="width: 30px; height: 20px;" type="text"/>

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TOTAL SCORE (    /100)    %