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Management of anterior cruciate ligament injury in lower-middle income countries focus on outcomes and health economics in Indonesia

Deviandri, Romy

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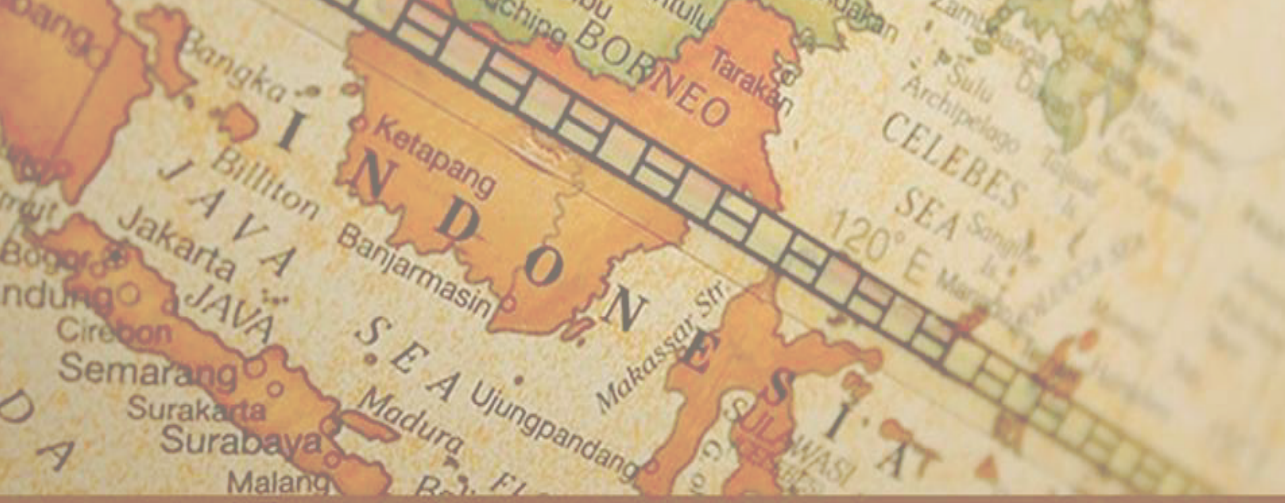
CHAPTER 4

Translation, validity, and reliability of the Indonesian version of the anterior cruciate ligament–return to sport after injury scale (ACL-RSI)

Romy Deviandri, MD; Hugo C. van der Veen, MD. Ph.D.; Andri M.T. Lubis, MD., Ph.D.; Maarten J. Postma, Ph.D.; Inge van den Akker-Scheek, Ph.D.

ABSTRACT

Background: The anterior cruciate ligament–return to sport after injury scale (ACL-RSI) measures athletes' emotion, confidence, and risk appraisal when returning to sports after an anterior cruciate ligament (ACL) injury and/or ACL reconstruction (ACLR).

Purpose: To translate the ACL-RSI into the Indonesian language and to assess its validity and reliability in Indonesian-speaking patients after ACLR.

Study design: Cohort study (diagnosis); Level of evidence 2.

Methods: After a forward-and-backward translation procedure, the validity and reliability of the Indonesian version of the ACL-RSI (I-ACL-RSI) were investigated. Patients who had undergone ACLR at a single hospital were asked to complete four questionnaires: I-ACL-RSI, Injury–Psychological Readiness to Return to Sport, Tampa Scale of Kinesiophobia, and International Knee Documentation Committee. After a 2-week interval, patients were asked to complete the I-ACL-RSI a second time. Following the COSMIN reporting guidelines (Consensus-Based Standards for the Selection of Health Measurement Instruments), we determined construct validity using hypothesis testing, as well as test-retest reliability, internal consistency, floor and ceiling effects, and measurement error.

Results: Of 200 eligible patients, 102 (51%) were included in the analysis. All predefined hypotheses on correlations between the I-ACL-RSI and the other questionnaires were confirmed, indicating good construct validity. An intraclass correlation coefficient of 0.90 (2-way random, type agreement) was found for the first and second I-ACL-RSI scores, indicating good test-retest reliability. A Cronbach alpha of 0.95 indicated good internal consistency, and no floor or ceiling effects were found. The standard error of measurement was

4

3.9, with the minimal detectable change calculated as 10.9 points at the individual level and 1.1 points at the group level.

Conclusion: Based on the study findings, the I-ACL-RSI can be considered a valid and reliable questionnaire for Indonesian-speaking patients after ACL injury and/or ACLR.

Keywords: ACL injuries; ACL-RSI; questionnaire; PROM; Indonesian translation

4

INTRODUCTION

The number of anterior cruciate ligament (ACL) reconstruction (ACLR) surgeries has increased gradually over the past decade. An estimated 400,000-500,000 ACLRs are performed each year in the United States, based on implant usage.[31] This number is expected to rise throughout the world as a result of increased adolescents' and young adults' participation in athletic activities. In Indonesia, the number of ACLRs rose by 42% in 2019 compared to 2018 (1575 implants in 2018 vs. 2236 in 2019).[6]

The ultimate goal of an ACLR is to return to sport (RTS) at the preinjury level.[9,20] Many factors affect sports resumption. Besides physical aspects, psychological factors play an essential role in RTS after ACLR.[22] In 2008, Webster et al[30] developed and analyzed the validity of the Anterior Cruciate Ligament–Return to Sport After Injury (ACL-RSI) scale, which measures athletes' emotion, confidence, and risk appraisal when returning to sports after anterior cruciate ligament (ACL) injury and/or ACLR. ACL-RSI scores recorded during rehabilitation are strongly associated with RTS.[23] The ACL-RSI is widely used and has been translated into many languages.

The aim of this study was to translate the English version of the ACL-RSI to Indonesian and to evaluate the validity and reliability of this questionnaire in patients after ACL injury. We hypothesized that the Indonesian version of the ACL-RSI (I-ACL-RSI) would be both valid and reliable for use in Indonesian patients with ACL injuries.

METHODS

Patients provided informed consent before participating in this study. The study was approved by the local institutional review board. Between June and September 2021, a total of 200 eligible patients were invited by email to participate in this study. All were Indonesian patients who underwent a primary ACLR between January 2019 and December 2020 at a hospital in Indonesia. Patients who were unable to understand the Indonesian language were excluded.

The ACL-RSI comprises 12 items, organized into three sub-groups of psychological factors: emotions, confidence in performance, and risk appraisal. An overall score is calculated by summing the scores for the individual items and then transforming the score to a scale from 0 to 100, with 100 indicating the absence of symptoms and higher levels of psychological readiness. We used an adapted version of the ACL-RSI according to Webster et al,[30] where the visual analog scale is replaced by an 11-point numeric rating scale, with boxes ticked from 0 to 100.

Translation Procedure

The developer of the original ACL-RSI was informed and gave her consent to an Indonesian translation of the ACL-RSI (Webster, personal communication, 2021). The translation of the English version into Indonesian was performed using a forward and backward translation procedure.[1,11] First, two independent Indonesian individuals with sufficient knowledge of English did a literal translation of the ACL-RSI into Indonesian (T1 and T2). Next, a synthesized version (T12) was composed by the annotation of the two initial translations, and a back-translation into English (BT1 and BT2) was performed by two independent professional translators. The back-translation was reviewed by a native English speaker to check for inconsistencies with the

original English version. An expert committee consisting of three sports medicine orthopaedic surgeons, one methodological expert, and one translator reviewed this Indonesian translation (T12). The Indonesian translation (T12) was summarized by the expert committee after considering the review of the forward-and-backward translation procedure; then, one of the authors (R.D.) edited the questionnaire into its prefinal version. This pre-final I-ACL-RSI was then pretested in 10 patients with ACL injury as a pilot study to ascertain feasibility and to identify any potential issues before making the questionnaire ready for use on a large scale. Next, the researcher (R.D.) documented any obstacles that patients faced while filling out the questionnaire. Last, the documentation was discussed by the expert committee and used to summarize the questionnaire into the final version of the I-ACL-RSI.

Testing Procedure

All study patients were sent two sets of questionnaires separately by email. The first assessment included the I-ACL-RSI and three other questionnaires: the Injury–Psychological Readiness to Return to Sport (I-PRRS) scale, Tampa Scale of Kinesiophobia (TSK), and International Knee Documentation Committee (IKDC) score. Patients also provided demographic characteristics and completed the Tegner Activity Scale to measure their preinjury levels of work and sports activities. Two weeks later, patients were asked to complete the I-ACL-RSI again (second assessment). Patients were instructed to fill out each set of questionnaires immediately and send them back.

To determine whether confidence regarding sports resumption remained indeed stable between completion of the assessments, the beginning of the second assessment questionnaire patients included the question "Has your confidence regarding sports resumption changed since filling out the initial questionnaire?" The three possible responses were (1) no change; (2) yes, the problem changed for the better; and (3) yes, the problem changed for the

worse. Only patients indicating no change in their confidence regarding sports resumption were included in the test-retest analysis. Data from patients who returned both questionnaires on the same day or more than one month apart was excluded from analyses, as was the data of patients whose level of activity was less than 5 according to the Tegner scale.

Measurement Instruments: I-PRRS, TSK, and IKDC

The I-PRRS questionnaire assesses an athlete's psychological readiness to resume sports participation after injury, scoring 6 items on a 100-point scale.[10] The score ranges from 0 to 60, with 60 indicating the highest confidence to RTS. We translated the I-PRRS into Indonesian following international guidelines.[1]

The TSK measures fear of reinjury attributed to movement and physical activity. It consists of 17 items scored on a 4-point Likert scale regarding the subjective experience of the injury and physical activity. The score ranges from 17 to 68, where 68 indicates a high level of fear.[17] We translated the TSK into Indonesian following international guidelines.[1]

The IKDC is designed to measure symptoms, function, and sports activity in patients with various knee conditions; it includes 18 questions. The form is scored by summing the scores for the individual items and then transforming the score to a scale ranging from 0 to 100, with 100 indicating absence of symptoms and higher levels of functioning.[15] The valid and reliable Indonesian version of the IKDC was used.[6]

Validity Testing

The construct validity of the I-ACL-RSI was assessed by determining its association with questionnaires measuring a comparable or related construct (i.e. the I-PRRS, TSK, and IKDC). Per the COSMIN reporting guidelines

(Consensus-Based Standards for the Selection of Health Measurement Instruments),[21] predefined hypotheses were formulated about the correlation between the I-ACL-RSI and the I-PRRS, TSK, and IKDC. It was expected that patients with better subjective knee function would be more likely to perceive themselves as psychologically prepared to RTS. We hypothesized that the I-ACL-RSI would positively correlate with the I-PRRS, TSK, and IKDC. Slagers et al.[25] showed a correlation of 0.79 and –0.46 between the Dutch-language ACL-RSI and the I-PRRS and TSK. Based on that study, we hypothesized a correlation of ≥0.6 between the I-ACL-RSI and the I-PRRS and a correlation of ≥–0.3 between the I-ACL-RSI and the TSK. The correlation between the Japanese version of the ACL-RSI and the IKDC score was 0.4.[14] Based on this finding, a correlation of ≥0.3 between I-ACL-RSI and IKDC was hypothesized.

The ACL-RSI was developed to measure psychological aspects rather than physical functioning, as were both the I-PRRS and TSK. By contrast, the IKDC was designed to measure physical functioning rather than psychological aspects. Therefore, lower correlations were expected between I-ACL-RSI and IKDC than between I-ACL-RSI and I-PRRS, and between I-ACL-RSI and IKDC than between I-ACL-RSI and TSK. Construct validity can be considered good when at least 75% of the hypotheses are confirmed.[27] Construct validity of the I-ACL-RSI was also determined by evaluating its structural validity when investigating its factor structure.

Floor and Ceiling Effects

The occurrence of floor and ceiling effects was assessed. If >15% of respondents reach the lowest or highest possible score, these effects are considered to exist.[27]

Reliability Testing

Under the COSMIN guidelines,[21] reliability was determined in terms of test-retest reliability, internal consistency, and measurement error. Test-retest reliability is about the extent to which patients' scores are consistent for reciprocated measurements; internal consistency involves the extent to which items of a questionnaire are related; and measurement error concerns a measure of systematic error of a patient's score that is not induced by actual changes in the measured construct. In addition, we analyzed absolute agreement, which depicts the magnitude of agreement in reciprocal measurements.

Statistical Analysis

Patient characteristics and questionnaire results were reported as mean and standard deviation (SD) or frequency and percentage. The Spearman rho values for construct validity were interpreted high ($r > 0.6$), moderate ($0.6 < r < 0.3$), or low ($r < 0.3$).[13] To analyze structural validity, exploratory factor analysis was performed on all I-ACL-RSI items using principal component analyses with varimax rotation.[18] Cronbach a was estimated to analyze internal consistency,[5] with values between 0.70 and 0.95 indicating good internal consistency.[27] The test-retest reliability of the I-ACL-RSI was assessed using the intraclass correlation coefficient (ICC),[21] and values were interpreted as poor (<0.5), moderate ($0.5-0.75$), good ($0.75-0.9$), or excellent (>0.90).[16] Minimal detectable change (MDC) and standard error of measurement (SEM) were analyzed to assess measurement error.

MDC at the individual level (MDC_{ind}) was using the formula $1.96 \times SEM \times \sqrt{2}$, and group-level MDC ($MDC_{grp}$) was estimated by dividing MDC_{ind} by $\sqrt{n}$.[27] SEM was determined by multiplying the pooled SD by $\sqrt{(1-r)}$, where r is the ICC (2-way random, type agreement).[7]

Absolute agreement between the first and second assessments of the I-ACL-RSI was analyzed using Bland-Altman plots: when 0 was in the 95% confidence interval (95% CI) of the mean difference between assessments, no systematic bias was present. The 95% limits of agreement were estimated with the following formula: mean difference ± 1.96 x SD_{diff}, where SD_{diff} is the SD of the mean difference between the first and second assessments of the I-ACL-RSI.[2] All statistical analyses were performed using SPSS Statistics Version 26.0 (IBM), and the level of significance was set at 5%.

4

RESULTS

Translation

The ACL-RSI was successfully translated into Indonesian (I-ACL-RSI) following guidelines.[1,11] No difficulties with completing the translated scale were found when pretesting the questionnaire in 10 subjects.

Patient characteristics

Of the 200 invited patients, 102 (51%) responded to the invitation. All patients (100%) filled out and returned two complete sets of questionnaires. No patients reported better or worse confidence regarding sports resumption when filling out the second questionnaire, thus all 102 participants were included in the test-retest analysis. No patients were excluded because of missing data.

The included patients were active people with a mean age of 29.4±6.3 years and Tegner level 7.1±1.8. Most of them were male and most participated in recreational sport activity. Demographic patient characteristics are presented in Table 1. Mean scores of the first and second assessments of the I-ACL-RSI were 63.5 ± 27.3 and 67.7 ± 23.6, respectively. All outcome scores can be found in Table 2.

Table 1. Demographic patient characteristics (N=102)

Characteristic	Mean ± SD or n (%)
Age (y)	29.4 ± 6.3
Sex	
Male	80 (78.4)
Female	22 (21.6)
Affected side	
Right	64 (62.7)
Left	35 (34.3)
Both	3 (3)
Level of sport	
Professional	3 (3)

recreational	99 (97)
Activity type at injury	
ADL	6 (6)
Sport	85 (83)
Traffic-related accident	9 (9)
Work	2 (2)
Tegner level preinjury	7.1 ± 1.8
Time between surgery and study participation, mo	13.2 ± 4.6
Abbreviations: ACL, anterior cruciate ligament; y, years; ADL, activities of daily living; SD, standard deviation	

Table 2. Outcome Scores

Measure	Mean ± SD
I-ACL-RSI: assessment 1	63.5 ± 27.3
I-ACL-RSI: assessment 2	67.7 ± 23.6
I-PRRS	40.7 ± 11.2
TSK	40.3 ± 11.4
IKDC	53.9 ± 13.8
Abbreviations: I-ACL-RSI, Indonesian version of Anterior Cruciate Ligament - Return to Sport After Injury scale; I-PRRS, Injury-Psychological Readiness to Return to Sport; TSK, Tampa Scale of Kinesiophobia; IKDC, International Knee Documentation Committee	

Validity

All predefined hypotheses on the magnitude of associations between I-ACL-RSI and I-PRRS, TSK, or IKDC were confirmed. The I-ACL-RSI showed a correlation higher than 0.6 with I-PRRS (r=0.68) and higher than 0.3 with TSK (r=0.65) and IKDC (r=0.45) (Table 3). The values indicated that the I-ACL-RSI was more strongly related to the I-PRRS and the TSK than to the IKDC.

Table 3. Association between the I-ACL-RSI and the I-PRRS, TSK, and IKDC

Correlation	*r* (Hypothesized)	*r* (Actual)
I-ACL-RSI vs I-PRRS	≥0.6	0.68
I-ACL-RSI vs TSK	≥−0.3	−0.65
I-ACL-RSI vs IKDC	≥0.3	0.45
Values are presented as Spearman rho correlation coefficients. Values with a colon		

present a comparison between the two categories. I-ACL-RSI, Indonesian version of Anterior Cruciate Ligament – Return to Sport After Injury; I-PRRS, Injury-Psychological Readiness to Return to Sport; TSK, Tampa Scale of Kinesiophobia; IKDC, International Knee Documentation Committee.

Factor analysis showed a 1-factor structure of the I-ACL-RSI, with an eigenvalue of 7.59 and explained variance of 63.25%, indicating that 63.25% of the variance of the scale is explained by true variance (the common factor). There were no floor or ceiling effects. None of the patients reached the maximum or minimum scores.

Test-Retest Reliability, Internal Consistency & Measurement Error

The ICC had a value of 0.91 (P < .001), and the 95% CI ranged from 0.86 to 0.94. Cronbach a was 0.95, indicating good internal consistency. MDC_{ind}, MDC_{grp}, and SEM were 10.9, 1.1, and 3.9, respectively. The Bland-Altman plot showed a mean difference between the I-ACL-RSI assessments of 2.4 (95% CI, 0.2-4.6; 95% limits of agreement, −48.6 to 43.9) (Figure 1). No systematic bias was found.
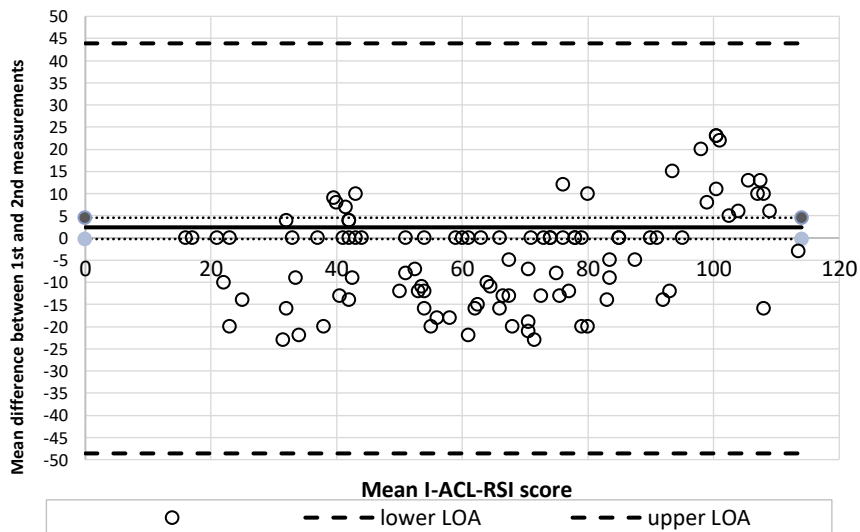
Figure 1. Bland-Altman plot of absolute agreement between the first and second assessments. The dotted lines represent the 95% CI, the dashed lines represent the limits of agreement (superior and inferior), the solid line represents the mean difference (intermediate), and the open circles represent data points.

4

DISCUSSION

We were able to confirm that the I-ACL-RSI has good construct validity, good test-retest reliability, good internal consistency, and no floor or ceiling effects. Based on these results, the I-ACL-RSI can be considered a valid and reliable questionnaire for patients with ACL injuries. The same result was observed in validity studies of the Japanese,[14] Chinese,[4] French,[3] and Turkish[12] versions of the ACL-RSI.

Factor analysis showed that the I-ACL-RSI primarily evaluates one dimension. Therefore, the three subgroups of psychological factors in the I-ACL-RSI— emotions, confidence in performance, and risk appraisal—cannot be separated, and one total score should be used. This result is in line with the original version,[30] as well as the Dutch,[25] Swedish,[19] and Norwegian versions.[8]

No floor or ceiling effects were observed. Theoretically, a ceiling effect could have occurred, especially in patients longer after their ACL injury, but that was not the case in this study (the mean interval from surgery to participation was 13.2 ± 4.6 months). Similarly, no floor or ceiling effects were found in the Dutch,[25] Norwegian,[8] and Spanish[24] translations of the ACL-RSI.

Test-retest reliability was excellent (ICC = 0.91), just as in the Dutch (0.94),[25] Norwegian (0.94),[8] French (0.90),[3] and Turkish (0.92)[12] versions of the ACL-RSI. Internal consistency of the I-ACL-RSI was good, with a Cronbach a of 0.95. Higher values are not desirable, as this may indicate a redundancy of questionnaire items. Good internal consistency was also shown in the original version (0.92)[30] and in the Italian (0.94),[28] Dutch (0.94),[25] Swedish (0.95),[19] and Norwegian (0.95)[8] versions. The Bland-Altman plot showed satisfactory absolute agreement, reporting only a slight difference between the mean scores of the first and second assessments of the I-ACL-RSI. No systematic bias was found.

The SEM of the I-ACL-RSI was low (SEM, 3.9; MDC_{ind}, 10.9; MDC_{grp}, 1.1) and comparable to 2 other versions: the Dutch (SEM, 5.5; MDC_{ind}, 15.3; MDC_{grp}, 1.5)[25] and Norwegian (SEM, 5.7; MDC_{ind}, 15.8; MDC_{grp}, 2).[8] Low MDC values at the group level indicate that the I-ACL-RSI can be used for group comparisons, as only low values are needed to detect change. But only values higher than the SEM can be differentiated from the measurement error; thus, to see a statistically significant change in scores on the I-ACL-RSI, the difference should be higher than the SEM. The difference between measurements should be greater than the MDC_{ind} value to distinguish from a measurement error and affirm that an important change occurred.

Besides the validity and reliability observed in this study, future research should explore the minimally important change (MIC; also known as minimal clinically important difference) as a measure of responsiveness of the I-ACL-RSI. The MIC is used to analyze whether a found difference is clinically important as perceived by the patient.[10] MIC values of the original version and the Dutch version of the ACL-RSI were calculated as 13.4 points[29] and 2.6 points, respectively.[26] Knowledge about the responsiveness and capability of the I-ACL-RSI to detect change over time is important for it to be used in longitudinal studies and in practice to follow Indonesian-speaking patients over time after their ACL injuries.

Limitations

A limitation of this study was that the response rate was about half (51%) and there were few female participants, yet the total number of participants is still acceptable. Under the COSMIN guidelines, at least 100 patients are an adequate number to study validity and 50 to study test-retest reliability.[27] Second, we did not ask whether the patients wanted to return to their sport activity after surgery. The ACL-RSI is most relevant if patients intend to resume sports, as its purpose is to measure psychological readiness to RTS. For patients who never

intend to resume sports, use of the ACL-RSI is not really relevant. But considering that the patients included in this study were an active population involved in sports activity before surgery, with pre-injury Tegner level 7.1 ± 1.8, we assumed they would return to their sport activity after surgery. Third, there is no information available on the validity and reliability of the Indonesian version of the I-PRRS and the TSK. However, the current study adds to the growing evidence on translation and validity of the ACL-RSI. Indonesian clinicians and researchers are now provided with a scale to evaluate psychological readiness in RTS following ACL injury and surgery for Indonesian-speaking patients.

4

CONCLUSION

The I-ACL-RSI was found to be both valid and reliable, therefore it can be used to measure psychological variables in patients after ACL injury and/or ACLR in the Indonesian population. More research is needed into evaluating the MIC and responsiveness of the I-ACL-RSI.

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REFERENCES

1. 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):3186-3191.
2. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet (London, England). 1986; 1(8476):307-31
3. Bohu Y, Klouche S, Lefevre N, Webster K, Herman S. Translation, cross-cultural adaptation and validation of the French version of the Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI) scale. Knee Surgery, Sport Traumatol Arthrosc. 2015; 23(4):1192-1196
4. Chen T, Zhang P, Li Y, et al. Translation, cultural adaptation and validation of simplified Chinese version of the anterior cruciate ligament return to sport after injury (ACL-RSI) scale. PLoS One. 2017; 12(8):1-14
5. Cronbach LJ, Meehl PE. Construct validity in psychological tests. Psychol Bull. 1955; 52(4):281-302
6. Deviandri, R., van der Veen, H., Lubis, A., Postma, MJ., van den Akker Scheek I. Translation, Cross-cultural Adaptation, Validity and Reliability of the Indonesian Version of the International Knee Documentation Committee Subjective Knee Form for Patients With Anterior Cruciate Ligament Injuries. Orthop J Sport Med. 2021; 29;9(9):23259671211038372
7. de Vet HCW, Terwee CB, Knol DL, Bouter LM. When to use agreement versus reliability measures. J Clin Epidemiol. 2006;59(10):1033-1039
8. Faleide AGH, Inderhaug E, Vervaat W, et al. Anterior cruciate ligament—return to sport after injury scale: validation of the Norwegian language version. Knee Surgery, Sport Traumatol Arthrosc. 2020; 28(8):2634-2643
9. Giesche F, Niederer D, Banzer W, Vogt L. Evidence for the effects of prehabilitation before ACL-reconstruction on return to sport-related and self-reported knee function: A systematic review. Mirkov D, ed. PLoS One. 2020; 15(10):e0240192
10. Glazer DD, College E. Development and Preliminary Validation of the Injury-Psychological Readiness to Return to Sport (I-PRRS) Scale. J Athl Train. 2009; 44(2):185-189.
11. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. J Clin Epidemiol. 1993; 46(12):1417-1432
12. Harput G, Tok D, Ulusoy B, et al. Translation and cross-cultural adaptation of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale into Turkish. Knee Surgery, Sport Traumatol Arthrosc. 2017; 25(1):159-164
13. Hinkle DE, Wiersma W, Jurs SG. *Applied Statistics for the Behavioral Sciences*. 4th ed. Boston, MA: Houghton Mifflin. 1998
14. Hirohata K, Aizawa J, Furuya H, et al. The Japanese version of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale has acceptable validity and reliability. Knee Surgery, Sport Traumatol Arthrosc. 2020; 28(8):2519-2525
15. Irrgang JJ, Anderson AF, Boland AL, et al. Development and validation of the International Knee Documentation Committee Subjective Knee Form. Am J Sports Med. 2001; 29(5):600-613.
16. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med. 2016; 15(2):155-163
17. Kori, S.H., Miller, R.P., & Todd DD. Kinisophobia: A new view of chronic pain behavior. Pain Manag. 1990; 3(1), 35–43.

4

18. Krabbe PFM. *The Measurement of Health and Health Status: Concepts, Methods and Applications from a Multidisciplinary Perspective*. 2017; 49-65

19. Kvist J, Österberg A, Gauffin H, Tagesson S, Webster K, Ardern C. Translation and measurement properties of the Swedish version of ACL-Return to Sports after Injury questionnaire. Scand J Med Sci Sport. 2013; 23(5):568-575

20. Marx RG, Jones EC, Allen AA, et al. Reliability, validity, and responsiveness of four knee outcome scales for athletic patients. J Bone Jt Surg - Ser A. 2001; 83(10):1459-1469

21. 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):737-745

22. Nwachukwu BU, Adjei J, Rauck RC, et al. How Much Do Psychological Factors Affect Lack of Return to Play After Anterior Cruciate Ligament Reconstruction? A Systematic Review. Orthop J Sport Med. 2019; 7(5):232596711984531

23. Sadeqi M, Klouche S, Bohu Y, Herman S, Lefevre N, Gerometta A. Progression of the Psychological ACL-RSI Score and Return to Sport After Anterior Cruciate Ligament Reconstruction: A Prospective 2-Year Follow-up Study From the French Prospective Anterior Cruciate Ligament Reconstruction Cohort Study (FAST). Orthop J Sport Med. 2018; 6(12):1-7.

24. Sala-Barat E, Álvarez-Díaz P, Alentorn-Geli E, Webster KE, Cugat R, Tomás-Sabado J. Translation, cross-cultural adaptation, validation, and measurement properties of the Spanish version of the anterior cruciate ligament-return to sport after injury (ACL-RSI-Sp) scale. Knee Surgery, Sport Traumatol Arthrosc. 2020; 28(3):833-839

25. Slagers AJ, Reininga IHF, van den Akker-Scheek I. The Dutch language anterior cruciate ligament return to sport after injury scale (ACL-RSI)–validity and reliability. J Sports Sci. 2017; 35(4):393-401.

26. Slagers AJ, van den Akker-Scheek I, Geertzen JHB, Zwerver J, Reininga IHF. Responsiveness of the anterior cruciate ligament–Return to Sports after Injury (ACL-RSI) and Injury–Psychological Readiness to Return to Sport (I-PRRS) scales. J Sports Sci. 2019; 37(21):2499-2505.

27. Terwee CB, Bot SDM, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007; 60(1):34-42

28. Tortoli E, Francini L, Giovannico G, Ramponi C. Translation, cross-cultural adaptation and validation of the Italian version of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale. Knee Surgery, Sport Traumatol Arthrosc. 2020; 30(4)1180-6

29. Webster KE, Feller JA, Lambros C. Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery. Phys Ther Sport. 2008; 9(1):9-15

30. Webster KE, Feller JA. Evaluation of the Responsiveness of the Anterior Cruciate Ligament Return to Sport After Injury (ACL-RSI) Scale. Orthop J Sport Med. 2021; 9(8):1-8

31. Wright RW, Bogunovic L. Revision Anterior Cruciate Ligament Reconstruction-The Multicenter Anterior Cruciate Ligament Revision Study. Second Ed. Elsevier. 2018

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Appendix 1. The Indonesian version of ACL-RSI scale

Nama   :
NRM   :
Tanggal Lahir :
Jenis Kelamin :

FORM KUESIONER ACL-RSI

<u>**Petunjuk**</u>:
Beri nilai pertanyaan berikut pada skala 0-100, dengan 0 pada kondisi nilai *terendah* dan 100 untuk *nilai tertinggi*.

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1. Apakah anda cemas berolahraga?

Sangat cemas   0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

2. Apakah anda merasa frustasi ketika harus mempertimbangkan lutut anda ketika hendak berolahraga?

Sangat frustasi   0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

3. Apakah anda merasa rileks saat berolahraga?

Sangat sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat rileks

4. Apakah anda takut bakal kembali mengalami cidera lutut saat berolahraga?

Sangat takut   0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

5. Apakah anda khawatir mengalami cidera lutut tak sengaja ketika olahraga?

Sangat khawatir   0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

6. Apakah anda yakin bahwa lutut anda akan baik-baik saja saat berolahraga?

Sama sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat yakin

7. Apakah anda yakin bahwa anda bisa berolahraga tanpa khawatir dengan lutut anda?

Sama Sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat yakin

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8. Apakah anda yakin bahwa lutut anda sanggup menahan tekanan?

Sama Sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat yakin

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9. Apakah anda yakin bahwa anda bisa berolahraga seperti penampilan anda sebelumnya?

Sama Sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat yakin

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10. Apakah anda yakin dengan kemampuan anda untuk tampil berolahraga dengan baik?

Sama Sekali tidak   0   10 20 30 40 50 60 70 80 90 100   sangat yakin

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11. Menurut anda, apakah ada kemungkinan bahwa anda kembali akan mengalami cidera lutut ketika berolahraga?

Sangat Mungkin 0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

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12. Apakah pikiran untuk melakukan operasi dan rehabilitasi kembali mencegah anda untuk berolahraga?

 Selalu   0 10 20 30 40 50 60 70 80 90 100   Sama sekali tidak

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