Validity and Reliability of Roland-Morris Disability Questionnaire: Cross-Cultural Adaptation Study for Low Back Pain Disability

Ni Kadek Pramesti Regina[1*], Anak Agung Gede Angga Puspa Negara[2], Gede Parta Kinandana[3], I Wayan Sugiritama[4]

[1]Bachelor and Profession of Physiotherapy Study Program, Faculty of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia
[2,3]Physical Therapy Department, College of Medicine, Universitas Udayana, Bali, Indonesia
[4]Histology Department, College of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia
*Correspondent: nnnanaree@gmail.com

ABSTRACT

Introduction: Around 60-80% of individuals experience low back pain in their lifetime, often leading to disability. The Roland-Morris Disability Questionnaire (RMDQ) is a tool used to assess disability caused by low back pain, measuring its impact on daily activities. To ensure its effectiveness, it is crucial to test the questionnaire's validity and reliability in different cultural contexts.
Methods: This study employed a descriptive survey method and a cross-sectional design with a purposive sampling technique, involving 124 subjects. Content validity was assessed through expert evaluation using the Content Validity Index (CVI), while construct validity was measured using Pearson Product-Moment Correlation. Reliability was evaluated through Cronbach's Alpha to assess internal consistency.
Results: The analysis revealed weak to moderate construct validity values (0.361–0.402) and excellent content validity index scores (S-CVI/Ave=1). Reliability analysis demonstrated good reliability with a Cronbach's Alpha value of 0.725.
Conclusion: The Indonesian version of the RMDQ questionnaire is valid and reliable for evaluating low back pain disability. It is suitable for use in clinical practice, enabling Indonesian patients to comprehend the questionnaire without losing the essence of the original version. Further research is needed to explore the onset and causes of low back pain disability in more depth.

Keywords: cross-cultural adaptation, validity, reliability, Roland-Morris Disability Questionnaire, Indonesia

INTRODUCTION

Low back pain is one of the most common musculoskeletal complaints, prevalent in many countries. In America and Canada, it is among the top five most common diseases, with 60-80% of the United States population experiencing it at some point.[1] The UK recorded 17.3 million cases, and in Indonesia, reports range from 7.6% to 37% of the population experiencing low back pain.[2]

Low back pain, defined as pain between the last ribs and the inferior gluteal fold with or without lower limb pain, can range from vague to shooting pain and may include a sensation of heat.[3] It can develop gradually or suddenly, with varying intensity from mild to severe.[4] Factors such as age, BMI, and unergonomic work posture contribute to its incidence.[5] The pain often involves multiple tissue structures, including joints, discs, ligaments, nerve roots, muscles, and fascia, with social, psychological, patho-anatomical, and neurophysiological factors contributing to its severity.[6]

The complexity of low back pain factors is considered in diagnoses and classified under the International Classification of Functioning, Disability, and Health (ICF), with the code b28013 Pain in the back.[7] This classification helps understand the impact on personal and social life, often leading to disability, which is defined as a limitation or lack of ability to perform activities typical for normal individuals. In the context of low back pain, disability often affects mobility, sitting, and standing.[8,9]

Disability is defined as a limitation or lack of ability resulting from an impairment to perform activities as performed by normal people in general. In complaints of low back pain, disability is often interpreted as pain that interferes with performing several activities, such as mobility, sitting, and standing.[10] The way to assess disability is through questionnaires, one of the questionnaires used to assess disability in low back pain is the Roland-Morris Disability Questionnaire (RMDQ).

The Roland-Morris Disability Questionnaire (RMDQ) is a self-reported outcome measure developed in 1983 in English to assess low back pain disability.[11] Its proven validity and reliability have led to its translation into numerous languages, including German, Thai, Japanese, Korean, Portuguese, and more.[12] However, each translation requires cross-cultural adaptation and testing for validity and reliability to ensure it is suitable for clinical practice in the respective country.

Adapting measurement tools to fit a country's cultural context significantly impacts diagnostic and evaluative outcomes in clinical practice. Despite the frequent use of RMDQ to assess low back pain disability globally, it has never been adapted and validated for the Indonesian population. This study aims to translate the RMDQ into Indonesian, adapt it culturally, and test its validity and reliability for use in clinical practice in Indonesia.

METHOD

This study used a descriptive survey method to determine content validity and an analytical observational cross-sectional method to assess construct validity and internal consistency reliability of the RMDQ. Content validity was assessed by expert evaluators, ensuring high accuracy and precision.[13] Construct validity was evaluated to confirm that the RMDQ measures the theoretical constructs of low back pain disability.[14] Internal consistency was assessed due to its efficiency in measuring simultaneously.[15]

The study population included individuals diagnosed with low back pain based on a doctor's assessment in independent practices in Denpasar and Badung, totaling 124 individuals. A purposive sampling technique was used, with a sample size based on the recommended subject-to-item ratio of 5:1, resulting in a minimum of 120 individuals as the RMDQ has 24 items.[16]

Inclusion criteria were: patients diagnosed with low back pain, able to communicate and write in Indonesian, willing to complete the questionnaire twice, and signed informed consent. Exclusion criteria included patients with spinal infections, systemic degenerative diseases, malignancies, pregnant women, and those with neurological deficits. Dropout criteria included participants not completing the questionnaire twice.

The study, conducted from February to May 2024, received ethical approval from Udayana University, Faculty of Medicine's ethical committee (protocol number 2024.01.1.0457). The RMDQ was initially translated into Bahasa by two native Indonesian translators fluent in English. The translations were synthesized into one document, followed by backward translation by two native English speakers fluent in Bahasa. The Indonesian RMDQ was reviewed by three experts, scoring relevance, clarity, simplicity, and ambiguity from 1-4. Items scoring 1-3 were revised.

The final Indonesian RMDQ was used by two researchers to evaluate subjects' low back pain disability. After a trial with 10 subjects, the questionnaire was filled independently by subjects, and researchers calculated the final score. The mean scores from both researchers were analyzed.

RESULTS

The research was conducted using a purposive sampling technique from February to May 2024. The target population included individuals who complained of or were clinically diagnosed with low back pain based on a doctor's assessment in independent practices in Denpasar and Badung, totaling 145 individuals. Of these, 130 agreed to participate, and 124 were selected as subjects after meeting the inclusion criteria.
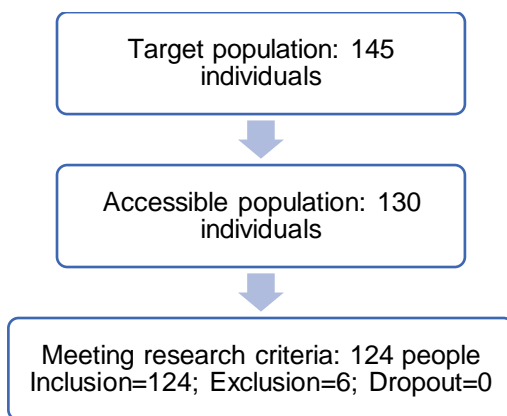
```
┌─────────────────────────────┐
│  Target population: 145     │
│  individuals                │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  Accessible population: 130 │
│  individuals                │
└─────────────────────────────┘
              │
              ▼
┌──────────────────────────────────────┐
│  Meeting research criteria: 124 people│
│  Inclusion=124; Exclusion=6; Dropout=0│
└──────────────────────────────────────┘
```

Figure 1. illustrates the research sampling stages.

Based on Figure 1, the total research sample consists of 124 individuals diagnosed with low back pain. The subject's levels of education are shown in Table 1.

Table 1. Subject's level of education:

Variable	Frequency	%
Levels of Education		
Elementary School	15	12.1
Junior High School	14	11.3
High School	43	34.7
Diploma	4	3.2
Bachelor	43	34.7
Master	5	4.0

Based on Table 1, most of the subject's education levels were high school and bachelor's (n=43; 34.7%). The education level of individuals is assumed with their capability to understand the RMDQ items.

The translation process of the original version of RMDQ to Bahasa consists of three phases: initial translation, backward translation, and discussion for the final version of the Indonesian version of RMDQ.

Table 2. Content Validity Scoring:

Items	Relevance			Clarity			Simplicity			Ambiguity		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
1.	4	3	4	3	4	4	3	4	4	4	4	4
2.	4	4	4	4	4	3	3	4	3	4	4	3
3.	4	3	4	4	4	4	3	4	4	4	4	4
4.	4	3	3	4	4	3	3	4	3	4	4	3
5.	4	3	3	4	4	3	3	4	3	4	3	3
6.	4	3	4	4	4	4	4	4	4	4	4	4
7.	4	3	4	3	3	4	3	4	4	3	3	4
8.	4	3	3	3	3	3	3	4	3	3	4	3
9.	4	3	4	4	4	4	3	4	4	4	4	4
10.	4	3	4	4	4	4	3	4	4	3	4	4
11.	4	3	4	4	4	4	3	4	4	3	4	4
12.	4	3	4	4	4	4	3	4	4	3	4	4
13.	4	4	4	4	4	4	3	4	4	4	4	4
14.	4	3	4	4	4	4	3	4	4	4	4	4
15.	4	4	4	4	4	4	3	4	4	4	4	4
16.	4	4	4	4	4	4	3	4	4	4	4	4
17.	4	3	4	4	4	4	3	4	4	4	4	4
18.	4	3	4	4	4	4	3	4	4	4	4	4
19.	4	4	4	3	4	4	3	4	4	3	4	4
20.	4	3	4	3	4	4	3	4	4	4	4	4
21.	4	3	4	4	4	4	3	4	4	4	4	4
22.	4	4	4	4	4	4	3	4	4	4	4	4
23.	4	3	4	4	4	4	3	4	4	3	4	4
24.	4	3	4	4	4	4	3	4	4	3	4	4

Based on Table 2, the researcher then labelled scores of 3-4 with 0 and 1-2 with 1 in Excel. I-CVI were calculated by totalling all the labelled scores and dividing it by 3 (total assessors) per item as shown in the next table.

Table 3. I-CVI per Criteria, Mean of I-CVI, and S-CVI/Ave:

No	Relevance	Clarity	Simplicity	Ambiguity	I-CVI
1.	1	1	1	1	1
2.	1	1	1	1	1
3.	1	1	1	1	1
4.	1	1	1	1	1
5.	1	1	1	1	1
6.	1	1	1	1	1
7.	1	1	1	1	1
8.	1	1	1	1	1
9.	1	1	1	1	1
10.	1	1	1	1	1
11.	1	1	1	1	1
12.	1	1	1	1	1
13.	1	1	1	1	1
14.	1	1	1	1	1
15.	1	1	1	1	1
16.	1	1	1	1	1
17.	1	1	1	1	1
18.	1	1	1	1	1
19.	1	1	1	1	1
20.	1	1	1	1	1
21.	1	1	1	1	1
22.	1	1	1	1	1
23.	1	1	1	1	1
24.	1	1	1	1	1
S-CVI/Ave					1

Based on the table above, the mean of the I-CVI is 0.79 proving all the items have good values. The S-CVI/Ave value from the 3 assessors is 1, indicating all items are acceptable as the S-CVI value exceeds 0.80.

Table 4. Validity Testing

No	Items	r Value	r Table	P Value	Conclusion
1.	Saya sering tinggal di rumah karena kondisi punggung saya.	0.368	0.1764	0.000	Valid
2.	Saya sering mengubah posisi tubuh untuk mencoba membuat punggung saya lebih nyaman.	0.372	0.1764	0.000	Valid
3.	Saya berjalan lebih lambat dari biasanya karena kondisi punggung saya.	0.361	0.1764	0.000	Valid
4.	Karena kondisi punggung saya, saya tidak mampu melakukan pekerjaan rumah seperti biasanya.	0.373	0.1764	0.000	Valid
5.	Karena kondisi punggung saya, saya menggunakan pegangan tangga untuk naik ke lantai atas.	0.384	0.1764	0.000	Valid
6.	Karena kondisi punggung saya, saya sering berbaring untuk istirahat.	0.370	0.1764	0.000	Valid
7.	Karena kondisi punggung saya, saya harus berpegangan pada sesuatu untuk bangun dari kursi dengan sandaran yang landai.	0.361	0.1764	0.000	Valid
8.	Karena kondisi punggung saya, saya berusaha membuat orang lain melakukan sesuatu untuk saya.	0.379	0.1764	0.000	Valid
9.	Saya berpakaian lebih lambat dari biasanya karena kondisi punggung saya.	0.362	0.1764	0.000	Valid
10.	Saya hanya bisa berdiri sebentar karena kondisi punggung saya.	0.363	0.1764	0.000	Valid
11.	Karena kondisi punggung saya, saya berusaha untuk tidak membungkuk atau berlutut.	0.358	0.1764	0.000	Valid
12.	Saya merasa sulit bangun dari kursi karena kondisi punggung saya.	0.368	0.1764	0.000	Valid
13.	Punggung saya hampir selalu sakit.	0.363	0.1764	0.000	Valid
14.	Saya merasa sulit membalikkan badan di tempat tidur karena kondisi punggung saya.	0.361	0.1764	0.000	Valid
15.	Nafsu makan saya kurang karena sakit punggung.	0.384	0.1764	0.000	Valid
16.	Saya kesulitan memakai kaus kaki atau stoking karena sakit punggung.	0.402	0.1764	0.000	Valid
17.	Saya hanya bisa berjalan dalam jarak dekat karena kondisi punggung saya.	0.366	0.1764	0.000	Valid
18.	Saya tidak bisa tidur dengan nyenyak karena kondisi punggung saya.	0.372	0.1764	0.000	Valid
19.	Karena sakit di punggung saya, saya membutuhkan bantuan orang lain untuk berpakaian.	0.372	0.1764	0.000	Valid
20.	Saya duduk sepanjang hari karena kondisi punggung saya.	0.377	0.1764	0.000	Valid
21.	Saya menghindari pekerjaan berat di rumah karena kondisi punggung saya.	0.374	0.1764	0.000	Valid
22.	Karena sakit punggung, saya lebih mudah tersinggung dan marah terhadap orang lain.	0.366	0.1764	0.000	Valid
23.	Saya naik ke lantai atas lebih lambat karena kondisi punggung saya.	0.363	0.1764	0.000	Valid
24.	Saya banyak berbaring di tempat tidur karena kondisi punggung saya.	0.361	0.1764	0.000	Valid

Based on Table 4, the P-value of p<0.05 is seen in all items and r value ≥ r table above. This indicates all items are valid and correlate significantly with total scores.

Table 5. Reliability Testing:

Cronbach's Alpha	Total Items
0.725	24

Results of the reliability testing on the Indonesian version of RMDQ show a Cronbach's Alpha of 0.725, indicating a good quality of internal consistency (0.70-0.90).

DISCUSSION

This study aimed to verify whether the Indonesian version of the RMDQ, following cross-cultural adaptation, is valid and reliable for evaluating disability in individuals diagnosed with low back pain. The subjects of this study were 124 individuals diagnosed with low back pain who met the research criteria. The education level of the subjects was collected and shown in the previous table.

Education level can indicate a person's cognitive function, which includes abilities such as thinking, learning, remembering, using language, problem-solving, judgment, and executive functions like planning and evaluating. Higher education levels are generally associated with better cognitive development.[17–19]

The initial translations were done by two translators from Indonesia fluent in English. The first translator was a high school language teacher with a TOEFL score of 537, and the second translator was a physiotherapy lecturer who studied in the UK with a TOEFL ISP score of 573. The back-translation was done by two native English speakers working

as language teachers in a private institution to ensure the essence of the RMDQ did not change. After a final discussion among three assessors, the final Indonesian version of the RMDQ questionnaire was formed and tested on 10 people who met the inclusion criteria. The results showed that the respondents understood the statements in the questionnaire, so the Indonesian version of the RMDQ could be used in this research.

Validity testing of the questionnaire was conducted using the Pearson Product Moment to assess construct validity and the Content Validity Index (CVI) to assess content validity. Based on Table 3, the mean I-CVI by three assessors was above 0.79, indicating that no statement items needed to be eliminated. The S-CVI/Ave value from the three assessors was 1, which is acceptable as it is above 0.8.

CVI calculations were performed for each dimension of content validity (relevance, clarity, simplicity, and ambiguity) with a maximum score of 4, divided by the total number of assessors (N=3). The overall CVI for each criterion in the content validity dimension was summed and then divided by the total assessors for each statement item, producing the I-CVI. The I-CVI values of each statement were then summed and divided by 4 (the number of content validity dimensions) to produce an average I-CVI. The average I-CVI results were then summed and divided by the total statement items (N=24) to obtain the S-CVI/Ave value. An S-CVI/Ave value greater than 0.9 is considered to have very good content validity. CVI values between 0.80-1.00 are considered acceptable, CVI values between 0.70-0.79 require revision, and CVI values below 0.70 are considered unacceptable.[20,21]

For construct validity testing, the r table value was determined based on the sample size. In this study, the sample size was 124 people, so the r value used was 0.1764. Based on Table 4, the construct validity test obtained a P-value of 0.000 (p<0.05) and r value ≥ r table, indicating that the instrument or items were significantly correlated with the total score (declared valid).[22]

Based on Table 4, the Indonesian version of the RMDQ questionnaire has one statement item with a moderate correlation coefficient value (0.40-0.69) and 23 statement items with a weak correlation coefficient value (0.10-0.39). Several factors could cause the weak correlation coefficient, including the non-linear relationship between variables, non-normally distributed variables, measurement errors, and sampling issues.[23,24]

Thus, all statements in the Indonesian version of the RMDQ questionnaire are valid, with correlation coefficients ranging from weak to moderate. The implication of this validity value is to help assess the extent to which each instrument item can measure what it is intended to measure, aligned with the concept and objectives set, ensuring the data obtained is relevant to the research objectives.

Reliability testing in this study was carried out using Cronbach's Alpha to test internal consistency. Initially, the questionnaire was filled out twice by the research subjects. Based on Table 5, reliability testing using Cronbach's Alpha on the 24 items obtained a value of 0.725.[25] A research instrument is considered reliable if it has a Cronbach's Alpha value greater than 0.70. Therefore, it can be concluded that the 24 items have reliable test results and good internal consistency.

The implication of the reliability value is to measure the consistency and accuracy of measurements over time. The higher the reliability value, the more consistent, relevant, and appropriate the research results are to the research objectives.

This research is expected to be useful for physiotherapists in assessing low back pain disability and to add insights into the development of science and the creation of an Indonesian-language measuring instrument for evaluating low back pain disability. Researchers also hope that this research can serve as a reference for other researchers who want to develop and continue similar research.

However, this study has several limitations. First, researchers could not group samples based on the onset and causes of low back pain disability experienced by the samples, resulting in heterogeneous data that could influence the data analysis results. Second, there may be biases in the sampling and measurement process that could affect the validity of the results. Third, since this study was conducted on a specific population in Denpasar and Badung, the generalizability of the results to a broader population may be limited.

The generalizability of this study's results may be limited by the specific characteristics of the population in Denpasar and Badung. Therefore, these findings might not be directly applicable to populations with different characteristics. Further research is needed to test the validity and reliability of the Indonesian version of the RMDQ in a broader and more diverse population to ensure better generalizability of the results.

Considering these limitations, the interpretation of the results should be done cautiously. Nevertheless, this study makes a significant contribution by providing a valid and reliable measuring tool for assessing low back pain disability in the Indonesian cultural context. Further research with larger and more diverse samples will help strengthen these findings and improve the external validity of the study results.

CONCLUSION

The Indonesian version of the RMDQ demonstrates satisfactory psychometric properties in this study. Construct validity testing revealed weak to moderate correlation coefficients (0.361–0.402) across its items, indicating a significant relationship between the questionnaire items and the total score. Meanwhile, the instrument showed excellent content validity with a perfect S-CVI/Ave score of 1, affirming its relevance and clarity for assessing low back pain disability among Indonesian patients. Reliability analysis using Cronbach's Alpha yielded a score of 0.725, indicating good internal consistency among the 24 questionnaire items. This reliability ensures that the instrument provides consistent results in measuring disability related to low back pain.

The implications of this study underscore the utility of the Indonesian RMDQ as a reliable and valid tool for clinical assessment in Indonesian settings. Its ease of use and comprehensive coverage of disability factors contribute to its applicability in physiotherapy practice and clinical research. However, it is essential to acknowledge the study's limitations, such as the heterogeneity of the sample, which may affect the generalizability of the findings.

Future research should aim to refine the questionnaire further by exploring subgroup analyses based on the onset and causes of low back pain disability. This approach could enhance the instrument's external validity and deepen our understanding of disability measurement in diverse patient populations. In conclusion, while the Indonesian RMDQ shows promise in clinical practice, continued research efforts are needed to validate and refine its application across broader patient demographics and healthcare contexts.

REFERENCES

1. Widipratama IPR, Wibawa A, Primayanti IDAID. Perbandingan Prevalensi Low Back Pain Non-Spesifik Antara Karyawan Housekeeping Yang Menerapkan Smk3 Dibandingkan Dengan Yang Tidak Menerapkan Smk3 Di Kabupaten Badung. Majalah Ilmiah Fisioterapi Indonesia [Internet]. 2019;7(2):49–53. Available from: http://kiss.kstudy.com/journal/thesis_name.asp?tname=kiss2002&key=3183676
2. Melani I, Saraswati PAS, Wahyuni N. Hubungan Posisi Duduk Dengan Nyeri Punggung Bawah Non Spesifik Pada Bagian Administrasi Dan Pelayanan Di Polda Bali. Majalah Ilmiah Fisioterapi Indonesia [Internet]. 2019;7(1):15–9. Available from: https://ojs.unud.ac.id/index.php/mifi/article/view/49619/29492
3. de Souza IMB, Sakaguchi TF, Yuan SLK, Matsutani LA, Do Espírito-Santo A de S, Pereira CA de B, et al. Prevalence of low back pain in the elderly population: A systematic review. Clinics. 2019;74.
4. Wahyu NR, Abdul AH. Faktor-Faktor Yang Mempengaruhi Kejadian Low Back Pain Dan Upaya Penanganan Pada Pasien Ashuma Therapi Sidoarjo. Jurnal Kesehatan Olahraga. 2022;10(1):75–84.
5. Parinduri AI, Widyaningsih F, Irmayani I, Ginting R, Octavariny R. Faktor yang Berhubungan dengan Kejadian Low Back Pain pada Pekerja Pembuat Batu Bata (cross sectional study). Jurnal Riset Hesti Medan Akper Kesdam I/BB Medan. 2021;6(2):156.
6. Wong CK, Mak RY, Kwok TS, Tsang JS, Leung MY, Funabashi M, et al. Prevalence, Incidence, and Factors Associated With Non-Specific Chronic Low Back Pain in Community-Dwelling Older Adults Aged 60 Years and Older: A Systematic Review and Meta-Analysis. Journal of Pain [Internet]. 2022;23(4):509–34. Available from: https://doi.org/10.1016/j.jpain.2021.07.012
7. Playford D. The International Classification of Functioning, Disability, and Health. Oxford Textbook of Neurorehabilitation. 2015;3–7.
8. WHO. WHO guideline for non-surgical management of chronic primary low back pain in adults in primary and community care settings [Internet]. World Health Organization. 2023. 1–243 p. Available from: https://www.ncbi.nlm.nih.gov/books/NBK599210/
9. Hartvigsen J, Hancock MJ, Kongsted A, Louw Q, Ferreira ML, Genevay S, et al. What low back pain is and why we need to pay attention. The Lancet. 2018;391(10137):2356–67.
10. Malasari RT, Dharmmika S, Andarini MY. Hubungan Antara Derajat Nyeri dengan Derajat Disabilitas pada Pasien Nyeri Punggung Bawah di RS Al – Ihsan Bandung The Relationship Between Degree of Pain and Degree of Disability in Low Back Pain penyakit). Sebanyak 80 % orang dewasa mengalami NPB pada. 2017;296–9.
11. Stevens ML, Lin CCW, Maher CG. The Roland Morris Disability Questionnaire. J Physiother [Internet]. 2016;62(2):116. Available from: http://dx.doi.org/10.1016/j.jphys.2015.10.003
12. Raheem S, Ibrahim AA, Ganiyu SO, Faruk AU, Akindele MO. Translation, Cross-cultural Adaptation and Psychometric Evaluation of the Hausa Roland-Morris Disability Questionnaire in Mixed Rural and Urban Nigerian Populations with Low Back Pain. Spine (Phila Pa 1976). 2021 Jun;46(11):E639–47.
13. Suryadi T, Alfiya F, Yusuf M, Indah R, Hidayat T, Kulsum K. Content Validity for the Research Instrument Regarding Teaching Methods of the Basic Principles of Bioethics. Jurnal Pendidikan Kedokteran Indonesia: The Indonesian Journal of Medical Education. 2023;12(2):186.
14. Budiastuti D, Bandur A. Validitas dan reliabilitas penelitian (Dilengkapi analisis dengan NVIVO, SPSS, dan Amos. In Metode Penelitian Pendidikan Matematika. Edisi asli. Jakarta: Jakarta : Mitra Wacana Media, 2018 © 2018 : Penulis; 2018. 224 p.
15. Wahyudi R. Uji Validitas Dan Reliabilitas Dengan Pendekatan Konsistensi Internal Kuesioner Pembukaan Program Studi Statistika Fmipa Universitas Bengkulu. FMIPA Universitas Bengkulu Jl WR Supratman Bengkulu 38123 [Internet]. 2017;1(1):1–22. Available from: http://sigitnugroho.id/e-Skripsi/0805 Uji Validitas Dan Reliabilitas Dengan Pendekatan Konsistensi Internal Kuesioner Pembukaan Program Studi Statistika Fmipa Universitas Bengkulu .pdf
16. Tsang S, Royse CF, Terkawi AS. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. Saudi J Anaesth. 2017;11(5):S80–9.
17. Khadijah. Pengembangan Kognitif Anak Usia Dini Teori dan Pengembangannya. Perdana Publishing. 2016. 62–76 p.
18. Pragholapati A, Ardiana F, Nurlianawati L. Gambaran Fungsi Kognitif pada Lanjut Usia (Lansia). JURNAL MUTIARA NERS. 2021 Feb 5;4:14–23.
19. Nugroho I, Asti A, Kuatno L. Hubungan Tingkat Pendidikan dan Aktifitas Fisik terhadap Fungsi Kognitif Lansia Usia 60 Tahun di Wilayah Kerja Puskesmas Gombong II Kabupaten Kebumen. Jurnal Ilmiah Kesehatan Keperawatan. 2017 Oct 1;13.
20. Rodrigues IB, Adachi JD, Beattie KA, MacDermid JC. Development and validation of a new tool to measure the facilitators, barriers and preferences to exercise in people with osteoporosis. BMC Musculoskelet Disord. 2017;18(1):1–9.
21. St. Marie B, Jimmerson A, Perkhounkova Y, Herr K. Developing and Establishing Content Validity of Vignettes for Health Care Education and Research. West J Nurs Res [Internet]. 2020 Nov 5;43(7):677–85. Available from: https://doi.org/10.1177/0193945920969693

22. Slamet R, Wahyuningsih S. Validitas Dan Reliabilitas Terhadap Instrumen Kepuasan Ker. Aliansi : Jurnal Manajemen dan Bisnis. 2022;17(2):51–8.
23. Schober P, Boer C, Schwarte LA. Correlation Coefficients: Appropriate Use and Interpretation. Anesth Analg. 2018 May;126(5):1763–8.
24. Aggarwal R, Ranganathan P. Common pitfalls in statistical analysis: The use of correlation techniques. Perspect Clin Res. 2016;7(4):187.
25. Yusup F. Uji Validitas dan Reliabilitas Instrumen Penelitian Kuantitatif. Jurnal Tarbiyah: Jurnal Ilmiah Kependidikan. 2018;7(1):17–23.