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Research Article

Reliability and validity of the musculoskeletal health literacy questionnaire (MSHLQ) among community-dwelling rural elderly: a pilot study

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ABSTRACT

Musculoskeletal disorders are a leading cause of disability among community-dwelling elderly, and health literacy specific to musculoskeletal health strongly influences self-management and treatment-seeking behaviour. Condition-specific instruments to assess musculoskeletal health literacy in rural elderly populations are limited. This pilot study evaluated the reliability and validity of a newly developed Musculoskeletal Health Literacy Questionnaire (MSHLQ). Methods: A cross-sectional pilot study was conducted among 50 community-dwelling elderly (age ≥ 60 years) in rural Ahilyanagar, Maharashtra, India. The self-developed 16-item MSHLQ comprises four domains — Accessing, Understanding, Appraising, and Applying information — each scored from four items on a 4-point Likert scale (0-3). Internal consistency was assessed using Cronbach's alpha, corrected item-total correlations, split-half (Spearman-Brown) reliability, and a one-way random-effects Intraclass Correlation Coefficient (ICC). Construct validity was examined through domain-total score correlations and inter-domain correlations using Pearson's coefficient. Results: The mean total MSHLQ score was 19.88 ± 11.08 (range 5-42). Overall Cronbach's alpha was 0.892. Corrected domain-total correlations ranged from 0.622 to 0.836, and all domains correlated significantly with the total score ($r = 0.753-0.918$, $p < 0.001$). Split-half reliability (Spearman-Brown corrected) was 0.908, and average-measures ICC was 0.758 (95% CI 0.628-0.852, $p < 0.001$). Based on total scores, 58% of participants demonstrated inadequate, 22% problematic, and 20% adequate musculoskeletal health literacy. Conclusions: The MSHLQ demonstrates good internal consistency and construct validity in this pilot sample of rural elderly, supporting its potential utility as a domain-specific instrument for assessing musculoskeletal health literacy. Further validation with item-level test-retest reliability and larger, more diverse samples is recommended before wider clinical application. outcomes.

Keywords: Musculoskeletal disorders, Health literacy, Reliability, Validity, Elderly, Questionnaire, Cronbach's alpha.

INTRODUCTION

Musculoskeletal disorders (MSDs) are recognized as one of the leading causes of disability and functional limitation worldwide. Conditions such as low back pain, osteoarthritis, neck pain, and rheumatoid arthritis contribute substantially to reduced quality of life, loss of productivity, and increased healthcare expenditure. Musculoskeletal conditions affect approximately 1.71 billion people globally and are among the major contributors to years lived with disability ^[1,5,10].

Health literacy (HL) has emerged as an important factor influencing health outcomes and healthcare utilization, referring to an individual's ability to obtain, understand, evaluate, and apply

health-related information to make informed decisions regarding health and wellbeing ^[2,11]. Inadequate health literacy has been linked to poorer health outcomes, delayed healthcare seeking, lower treatment adherence, increased hospitalization rates, and higher healthcare costs ^[3]. Musculoskeletal health literacy (MSHL) specifically encompasses an individual's knowledge and understanding of musculoskeletal health, including awareness of risk factors, symptom recognition, preventive measures, treatment options, and self-management strategies ^[4,8].

Existing general health literacy tools such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of

Functional Health Literacy in Adults (TOFHLA) mainly focus on reading comprehension and numerical abilities and do not adequately capture musculoskeletal-specific knowledge and self-management behaviour^[4,13]. More broadly applicable multidimensional instruments such as the Health Literacy Questionnaire (HLQ) capture health literacy across diverse populations and settings but were not designed to probe musculoskeletal-specific knowledge, while condition-specific patient-reported outcome tools such as the Musculoskeletal Health Questionnaire (MSK-HQ) assess symptom burden and functional status rather than the literacy skills needed to access, understand, appraise, and apply musculoskeletal health information^[21]. This gap motivated the development of the Musculoskeletal Health Literacy Questionnaire (MSHLQ), a condition-specific, culturally appropriate instrument for community-dwelling rural elderly in India. A recent systematic review confirmed that health literacy remains inadequate among a substantial proportion of older adults with musculoskeletal problems and continues to be associated with poorer pain, function, and quality-of-life outcomes, reinforcing the need for validated, condition-specific measurement tools of this kind^[16]. Before wider use, pilot testing of a newly developed instrument is essential to establish its reliability, validity, clarity, and practicality^[6]. This pilot study therefore aimed to evaluate the internal consistency reliability and construct validity of the MSHLQ among community-dwelling rural elderly^[10].

MATERIAL AND METHODS

Study design and setting

A cross-sectional, descriptive pilot study design was employed. Data were collected across rural community settings in Ahilyanagar, Maharashtra, India, between 22 April 2026 and 20 June 2026. Study sites included community health centres and senior citizen community groups.

Participants

Fifty community-dwelling elderly individuals were recruited by convenience sampling. Inclusion criteria were: age ≥ 60 years, community dwelling, cognitively intact (Mini-Cog score ≥ 3), ability to understand questionnaires in English or Marathi, and provision of written informed consent. Individuals with recent musculoskeletal or neurological impairment limiting participation, those who were bedridden or critically ill, and residents of old-age or nursing homes were excluded.

Ethical approval

The study was approved by the Institutional Ethics Committee of Dr. Vithalrao Vikhe Patil Foundation's College of Physiotherapy, Ahilyanagar. Written informed consent was obtained from all participants, and confidentiality was maintained through pseudonymized study identifiers.

Instrument

The MSHLQ is a self-developed, 16-item instrument organized into four domains — Accessing Information, Understanding Information, Appraising Information, and Applying

Information — with four items per domain. Items were generated following literature synthesis, an expert panel of five physiotherapy faculty members specialising in geriatric rehabilitation, and focus group discussions ($n = 8$) with community-dwelling elderly, followed by content validity review and preliminary feasibility testing. Each item is rated on a 4-point Likert scale from "very difficult" (0) to "very easy" (3). Domain scores are the sum of the four constituent items (range 0-12), and the total score (range 0-48) is interpreted as inadequate (0-16), problematic (17-32), or adequate (33-48) health literacy.

Statistics

Data were analysed for internal consistency reliability and construct validity. As item-level response data were recorded at the domain level (four domain sub-scores per participant), reliability analysis was conducted treating the four domain scores as the units of analysis, consistent with standard multi-domain composite-reliability procedures. Cronbach's alpha coefficient was computed for the overall 4-domain scale, together with the corrected domain-total correlation and alpha-if-domain-deleted for each domain. Split-half reliability (domains 1+2 versus 3+4) with Spearman-Brown correction was additionally computed as a cross-check. As a further reliability estimate, a one-way random-effects Intraclass Correlation Coefficient (ICC) was calculated across the four domain scores, with single-measures and average-measures ICC values reported alongside their 95% confidence intervals and associated F test, and interpreted using established benchmarks for reliability coefficients^[14]. Construct validity was assessed through Pearson correlation of each domain score with the total score, and an inter-domain correlation matrix was generated to examine convergent relationships among domains. Descriptive statistics (mean, standard deviation, range) were computed for each domain and the total score, and participants were categorised by health-literacy level. A two-tailed p -value < 0.05 was considered statistically significant. Analyses were performed using SPSS-equivalent statistical procedures implemented in Python (pandas, NumPy, SciPy), which reproduce the standard SPSS Reliability Analysis (Scale) and Bivariate Correlation (Pearson) algorithms.

RESULTS

Table 1: Descriptive statistics of MSHLQ domain and total scores (N = 50)

Domain	Mean	SD	Minimum	Maximum
Accessing Information	7.78	2.66	3	2
Understanding Information	5.14	3.44	0	2
Appraising Information	3.84	3.28	0	11
Applying Information	3.14	3.31	0	10
Total Score (0-48)	19.88	11.08	5	42

A total of 50 community-dwelling elderly participants completed the MSHLQ. Table 1 presents the descriptive statistics for each domain and the total score.

Reliability

The overall Cronbach's alpha for the 4-domain MSHLQ scale was 0.892, indicating good internal consistency according to conventional benchmarks [9]. Corrected domain-total correlations exceeded the commonly used 0.30 cut-off for every domain, and dropping any single domain did not meaningfully raise the overall alpha value, suggesting each domain adds genuine value to the composite scale (Table 2). A split-half check, obtained by correlating the combined Accessing and Understanding scores against the combined Appraising and Applying scores, produced $r = 0.832$, rising to 0.908 once the Spearman-Brown correction was applied, reinforcing the scale's internal reliability. A one-way random-effects Intraclass Correlation Coefficient (ICC) computed across the four domain scores yielded a single-measures ICC of 0.440 (95% CI 0.296-0.589) and an average-measures ICC of 0.758 (95% CI 0.628-0.852), both statistically significant ($F(49,150) = 4.140, p < 0.001$) (Table 6). While the single-measures ICC was only fair, the average-measures ICC — more directly comparable to the composite reliability of the four-domain total score — fell in the good range, broadly corroborating the Cronbach's alpha and split-half findings.

Table 2: Internal consistency reliability of the MSHLQ (Cronbach's alpha = 0.892)

Domain	Corrected domain-total correlation	Cronbach's alpha if domain deleted
Accessing Information	0.622	0.910
Understanding Information	0.836	0.833
Appraising Information	0.823	0.838
Applying Information	0.788	0.852

Table 3: Domain-total score correlations (construct validity)

Domain	Pearson r with Total Score	p-value
Accessing Information	0.753	<0.001
Understanding Information	0.918	<0.001
Appraising Information	0.910	<0.001
Applying Information	0.884	<0.001

Table 4: Inter-domain correlation matrix

Domain	Accessing	Understanding	Appraising	Applying
Accessing	1.000	0.581	0.590	0.545
Understanding	0.581	1.000	0.802	0.772
Appraising	0.590	0.802	1.000	0.738
Applying	0.545	0.772	0.738	1.000

Health literacy levels

Based on total MSHLQ scores, 29 participants (58.0%) were classified as having inadequate health literacy, 11 (22.0%) as problematic health literacy, and 10 (20.0%) as adequate health literacy (Table 5); this distribution is illustrated graphically in Figure 1.

Table 5: Distribution of participants by musculoskeletal health literacy level

Health Literacy Level	n	%
Inadequate (0-16)	29	58.0
Problematic (17-32)	11	22.0
Adequate (33-48)	10	20.0
Total	50	100.0

Table 6: Intraclass correlation coefficient (ICC) across MSHLQ domain scores

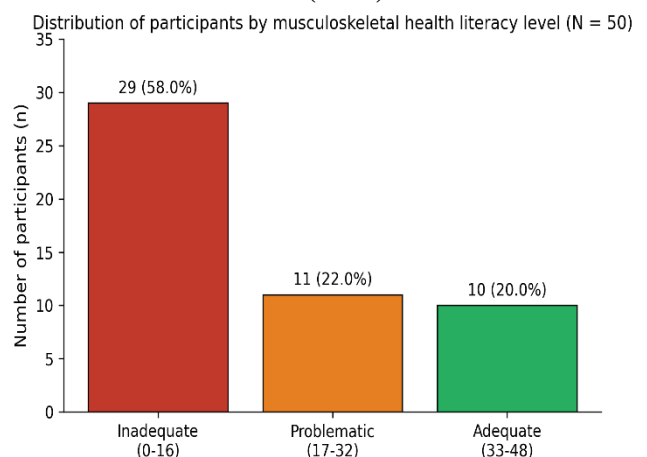
Measure	ICC	95% CI	F value	df1, df2	Sig.
Single Measures	0.440	0.296-0.589	4.140	49, 150	<0.001
Average Measures	0.758	0.628-0.852	4.140	49, 150	<0.001

Note: One-way random-effects model in which people effects are random; the four domain scores (Accessing, Understanding, Appraising, Applying Information) served as the measures.

Validity

Construct validity was supported by strong, statistically significant correlations between each domain and the total score (Table 3): Accessing Information ($r = 0.753$), Understanding Information ($r = 0.918$), Appraising Information ($r = 0.910$), and Applying Information ($r = 0.884$), all $p < 0.001$. Inter-domain correlations (Table 4) ranged from 0.545 to 0.802, indicating that domains were moderately-to-strongly related while retaining sufficient independence to represent distinct facets of health literacy, consistent with the theoretical four-domain structure of the instrument.

Figure 1: Distribution of participants by musculoskeletal health literacy level (N = 50)



This pilot investigation examined the psychometric performance of the newly developed MSHLQ in 50 rural community-dwelling elderly individuals. An overall Cronbach's alpha of 0.892 surpasses the widely used 0.70 cut-off for internal consistency and sits within the "good" band (0.80-0.89), bordering on "excellent", implying that the four domains combine coherently into a single measure of musculoskeletal health literacy. Every domain returned acceptable-to-strong corrected item-total correlations (>0.60), and dropping any one domain did not appreciably improve scale reliability, which argues for keeping all

four domains in the final tool. The complementary ICC analysis reinforced this picture: the average-measures ICC of 0.758 fell in the "good" reliability range and aligned closely with the Cronbach's alpha and split-half estimates, whereas the lower single-measures ICC of 0.440 is expected given that a single domain score is inherently less stable than the four-domain composite — this single-versus-average gap is a known property of ICC rather than evidence of poor reliability.

Construct validity findings — strong correlations between each domain and the total score, together with moderate-to-strong but non-redundant inter-domain correlations — support the theoretical four-domain structure of health literacy proposed by Sørensen et al. and adapted here to the musculoskeletal context (accessing, understanding, appraising, and applying information) [11]. The Accessing Information domain showed a comparatively lower item-total correlation and a narrower score range than the other domains, which may reflect ceiling effects, given that most participants scored relatively highly on this domain (mean 7.78 of a maximum 12) — a pattern warranting item review during questionnaire refinement. This condition-specific approach mirrors a broader recent trend toward rigorously developed, population-specific health literacy instruments, exemplified by a 2025 digital health literacy questionnaire validated in older adults using a comparable multi-domain, expert-panel-informed design process [15,17].

In line with earlier work associating poor health literacy with worse functional status and weaker self-management in older adults [7,12], more than half of this rural sample (58%) fell into the inadequate musculoskeletal health literacy category, pointing to a clear gap that targeted health education and physiotherapy-led awareness programmes could help close in this population. This is in line with a recent systematic review showing that individually focused health-literacy interventions in older adults are the ones most consistently associated with improved health-literacy outcomes, supporting a personalised rather than purely generic approach to future MSHLQ-guided interventions [18]. Recent trial evidence reinforces this direction: multidisciplinary, education-based interventions combining physiotherapy, psychosocial support, and structured health education have shown promise for improving outcomes in elderly populations with musculoskeletal pain [19].

Limitations

Several limitations should be noted. First, item-level (16-item) response data were not available for analysis; reliability and validity were therefore computed at the domain level (four domain sub-scores), which is a reasonable but conservative approximation of item-level Cronbach's alpha and may not fully capture item-level redundancy or ambiguity. Second, the Intraclass Correlation Coefficient reported here was computed across the four domain scores within a single administration and reflects inter-domain consistency rather than temporal stability; true test-retest reliability

over the planned two-week interval could not be computed in the present analysis because retest data were not available at the time of this report, and this remains an important next step and is recommended as a priority for the full validation study. Third, the sample size ($n = 50$), while adequate for an initial pilot reliability assessment, is relatively small for confirmatory factor-analytic validation. Finally, convenience sampling from a single rural district limits generalizability to other elderly populations.

CONCLUSION

The Musculoskeletal Health Literacy Questionnaire (MSHLQ) demonstrated good internal consistency (Cronbach's $\alpha = 0.892$) and satisfactory construct validity in this pilot study of rural community-dwelling elderly individuals. These findings suggest that the MSHLQ is a reliable and effective domain-specific instrument for assessing musculoskeletal health literacy in this population. The questionnaire may help identify health literacy gaps and support targeted educational and rehabilitation interventions. However, the results should be interpreted cautiously due to the small sample size. Further validation, including test-retest reliability, expert-based content validity indexing, and confirmatory factor analysis in a larger and more diverse population, is recommended before widespread clinical and research use.

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Conflicts of interest

The authors have no conflicts of interest to declare.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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