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Translation, cultural adaptation, and psychometric validation of the Death Literacy Index for Sinhala-speaking populations in Sri Lanka: a cross-sectional validation study

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Abstract

Background

Death literacy (DL) is a multidimensional construct encompassing the knowledge, skills, and capacities required to make informed decisions about end-of-life (EoL) care. Despite Sri Lanka's rapidly ageing population and growing demand for palliative care, no validated Sinhala-language tool for assessing death literacy exists. This study aimed to translate, culturally adapt, and validate the Death Literacy Index (DLI) for Sinhala-speaking adults in Sri Lanka.

Methods

The DLI was translated and culturally adapted using the five-step Beaton et al. (2000) protocol. Psychometric validation was conducted among 302 family and professional caregivers recruited from Colombo South Teaching Hospital. Internal consistency was evaluated using Cronbach's alpha, and construct validity was assessed through exploratory factor analysis (EFA) using Principal Axis Factoring with Promax oblique rotation.

Results

The Sinhala DLI demonstrated good overall internal consistency (α = 0.892). Subscale reliability varied, with Factual Knowledge showing the strongest performance (α = 0.872) and Hands-on Care the weakest (α = 0.512), largely attributable to ceiling effects. EFA yielded a five-factor structure accounting for 53.20% of total variance, partially consistent with the original six-domain model. Floor effects were pronounced in items relating to formal palliative care services, advance care planning, and institutional support structures, reflecting limited development of these services in Sri Lanka.

Conclusions

The Sinhala DLI demonstrates adequate overall reliability and acceptable construct validity, supporting its use as a research and evaluation tool for assessing death literacy in Sri Lanka. Cultural restructuring of several domains reflects the relational, community-embedded nature of caregiving in Sri Lankan society. Future work should prioritise confirmatory factor analysis, test-retest reliability, and multi-site validation across diverse Sri Lankan communities.

Introduction

Death literacy (DL) has emerged as a vital construct that reflects an individual's knowledge, skills, and attitudes about death, dying, and bereavement. It is the knowledge and skills that an individual needs to gain access to, understand, and make informed choices about care options at end of life (EoL) and death.

[1, 2] Critically, DL extends beyond factual information to encompass the practical, emotional, and cultural capacities required to make informed decisions regarding EoL care, including the ability to navigate complex legal, ethical, and systemic dimensions of dying.[1, 3] People and communities with high levels of death literacy have context-specific knowledge about the death system and the ability to put that knowledge into practice. Positioned within a public health framework, DL is understood as both an outcome of personal and collective experiences with death and dying and a resource that individuals and communities can draw upon to strengthen their capacity for future caring.[1]

The concept of death literacy emerged within the broader framework of public health palliative care (PHPC) and the compassionate communities movement, where communities are viewed as active participants in supporting dying, death, caregiving, and bereavement rather than passive recipients of professional healthcare services.[1, 4] Public health approaches, such as the health promoting palliative care model and compassionate communities, advocate for a shift towards a social model of EoL care in which each social actor is empowered to contribute, with recognition of the substantial burden borne by informal carers and the need for entire communities — rather than professional service providers alone — to support individuals at EoL. Foundational empirical work by Horsfall et al. demonstrated that as people developed their death literacy through the experience of informal caring networks, those networks grew in the number and intensity of relationships, increasing participants' sense of community connection and ultimately building the community's broader capacity to care. In this sense, DL is not merely an individual attribute but a form of social and community capital, accumulated through embodied, relational experience.

One of the key tools developed to assess death literacy is the Death Literacy Index (DLI), originally developed in Australia, which measures knowledge and skills related to EoL care options.[1, 5] The DLI is a 29-item self-report measure with a higher-order factor structure composed of four subscales: Practical Knowledge (encompassing a Talking Support and a Hands-On Care subscale), Experiential Knowledge, Factual Knowledge, and Community Knowledge (encompassing Accessing Help and Support Groups subscales). This multidimensional structure reflects the understanding that DL cannot be reduced to declarative knowledge alone but must also capture the experiential, relational, and community-embedded dimensions of caring competence.[1, 5] The DLI has potential to significantly advance public health approaches to palliative care by determining levels of death literacy across multiple contexts, including at a community or national level, and by evaluating the outcomes of public health intervention [2]

There is growing recognition of the need for culturally adapted and validated tools to assess DL in non-English-speaking populations. The DLI has been successfully adapted and validated in various countries, including the United Kingdom, Sweden, and China.[2, 6, 7] Psychometric evaluation in the UK confirmed the DLI as a reliable and valid measure of death literacy, with population-level benchmarks suggesting that the UK population could strengthen capacity particularly in factual knowledge and accessing help. In Sweden, the culturally adapted Swedish-language version (DLI-S) demonstrated satisfactory psychometric properties with support for validity based on internal structure, consistent with findings from other language versions. In China, translation, cultural adaptation, and validation across 3,221 participants in

five cities confirmed high internal consistency and satisfactory validity, with measurement invariance demonstrated across genders and experiences of parental death. These international adaptations have confirmed the DLI's psychometric robustness while underscoring that cultural sensitivity and contextual relevance are indispensable when assessing death literacy across diverse populations.

Sri Lanka is one of the fastest-ageing countries in the world, with this rapid demographic transition expected to result in one quarter of the population being elderly by the year 2041.[8] Within South Asia, Sri Lanka is demographically unique as the only country with a significantly ageing population, driven by sustained declines in fertility and increases in life expectancy. This demographic trajectory carries profound implications for health and social care planning, as profound challenges face the country, especially with respect to planning adequate elderly-oriented services across both the social care and healthcare sectors.[8, 9] With such an exponential rise in the older population, and a corresponding increment in the prevalence of chronic and terminal illnesses, the demand for comprehensive EoL care services becomes increasingly pressing. This growing demand for end-of-life support, driven by population ageing and rising rates of chronic and terminal illness, underscores the urgent need for a well-developed, equitably accessible palliative care system capable of supporting patients and families through the dying process. However, palliative care in Sri Lanka remains an emerging discipline, with services concentrated in a small number of urban tertiary centres and only partially integrated into mainstream health policy and pre-service health professional education. Emerging and unevenly distributed palliative care discipline in Sri Lanka is further constrained by the absence of a validated, culturally appropriate tool specifically designed to assess death literacy, in contrast to several other validated instruments already available in the Sri Lankan palliative care context for related but distinct constructs such as palliative care knowledge and spiritual needs [10] which further constrains the ability of clinicians and policymakers to evaluate and respond to population needs.[8, 11]

Sinhala, the majority language of Sri Lanka, does not currently have a validated tool for assessing death literacy, creating a critical gap in understanding how Sri Lankans perceive and manage death-related experiences. The importance of addressing this gap is underscored by a broader pattern in Sri Lankan research, where the absence of validated Sinhala-language instruments has been consistently identified as a barrier to rigorous clinical and public health assessment. A validated DLI in Sinhala would extend this emerging methodological infrastructure to the domain of EoL care. Beyond its methodological value, systematic assessment of death literacy has practical relevance for patient and family-centred care: higher death literacy has been linked to greater engagement in advance care planning, more informed and timely decision-making about end-of-life preferences, and improved psychological preparedness for death among patients and family caregivers, all of which contribute to enhanced quality of life and a greater likelihood of achieving what is broadly understood as a “good death”, one that is congruent with the dying person’s values, wishes, and cultural and spiritual beliefs.[1, 3] A validated Sinhala DLI would therefore enable clinicians and policymakers to identify population groups and communities with lower death literacy who may benefit most from targeted death education, advance care planning support, and community-based palliative care initiatives, providing a practical entry point for strengthening advance care planning practices that remain underdeveloped within the current Sri Lankan health system.

The translation and cultural adaptation of the DLI for Sinhala-speaking communities directly addresses this gap, providing a key instrument for healthcare professionals and policymakers to evaluate and improve palliative care services in Sri Lanka. This study therefore aimed to translate, culturally adapt, and validate the DLI for use in Sinhala-speaking populations. Such a tool will enable healthcare providers, policymakers, and researchers to better understand the public's knowledge and attitudes about death and dying, informing EoL care strategies, death education programmes, and community capacity-building initiatives. The successful validation of a Sinhala DLI would represent not only an important methodological contribution but also a critical step towards embedding the public health palliative care framework within a country that is rapidly confronting the consequences of demographic ageing without yet having developed the institutional and community infrastructure to meet those demands. [10,12,]

Methods

This study was conducted in two phases: translation and cultural adaptation of the DLI into Sinhala, followed by a validation study of the adapted version in a sample of Sinhala-speaking adults. Permission was obtained from the original authors who composed and validated the DLI. The translation of the instrument was performed according to the recommended guidelines provided by Beaton et al. (2000) on cross-cultural adaptation of self-reported measures.[13] The translation process included five steps: forward translation, synthesis of a common version, back translation, expert committee consolidation, and pretesting.

Phase 1: Translation and cultural adaptation

Phase 1 commenced with the initial translation of the DLI from English into Sinhala by two independent bilingual experts proficient in both languages and familiar with end-of-life care concepts. The two translations were compared, and discrepancies were resolved through discussion between the translators and the research team. A consensus Sinhala version was developed, which was back-translated into English by two other bilingual experts who were not involved in the initial translation. This back-translation was compared with the original DLI to verify conceptual equivalence, and discrepancies were resolved prior to synthesising a common Sinhala version of the instrument. A panel of experts in Sinhala language, palliative care, psychology, and Sri Lankan cultural studies reviewed the Sinhala version for cultural relevance, face validity, content validity, and appropriateness. Items that were not culturally appropriate were modified to reflect local practices and beliefs about death. Cognitive debriefing interviews were conducted with a sample of n = 12 Sinhala-speaking individuals to assess the comprehensibility and relevance of the adapted Sinhala DLI. Feedback from these interviews led to minor wording revisions in three items to improve clarity and cultural appropriateness, with no items requiring structural modification.

Phase 2: Validation study

Phase 2 was conducted as a descriptive validation study to assess construct validity and reliability at the selected medical wards of Colombo South Teaching Hospital (CSTH). The study population comprised family caregivers aged 18 years or above of patients who were able to understand and communicate in Sinhala. Caregivers who were remunerated for their caregiving role or who were themselves experiencing advanced physical or psychological frailty, critical illness, or were at end of life were excluded.

The sample size was calculated based on a subject-to-variable (STV) ratio of 10:1, a widely used heuristic for exploratory factor analysis.[13] Given that the DLI comprises 29 items, the minimum required sample size was 290 participants. An additional 5% was added to account for anticipated non-response, yielding a target recruitment of 305 participants. Consecutive sampling was used until the calculated target was reached, resulting in a final analytical sample of N = 302.

Data were collected using an interviewer-administered questionnaire, administered to consecutively recruited eligible caregivers as they presented to the study wards, until the calculated sample size was reached, comprising the Sinhala DLI and a brief sociodemographic characteristics questionnaire. The interviewer was a pre-internship medical graduate a recently qualified medical doctor who has completed the MBBS degree and is awaiting formal internship placement, who received structured training in questionnaire administration, informed consent procedures, and sensitivity in end-of-life communication prior to data collection. Pre-testing of the questionnaire was conducted among 10 family caregivers attending a medical outpatient clinic, and appropriate modifications were made accordingly.

After obtaining ethical approval and administrative clearance from the Director of CSTH, the trained data collector conducted interviews in the respective medical wards over a 6 month period, from October 2025. The study's purpose was communicated to eligible participants, followed by the distribution of an information sheet. Prior to obtaining informed written consent, participants were given the opportunity to read the information sheet and clarify any questions. Interviews were carried out with minimal disruption to usual ward processes.

Data analysis

Data were analysed using SPSS version 25. Reliability testing assessed internal consistency using Cronbach's alpha, with a value of ≥ 0.70 considered acceptable for research instruments. Cronbach’s alpha quantifies the degree of inter-item correlation within the overall scale and each subscale, providing a global index of internal consistency; values approaching 0.90 are preferred for instruments intended to support individual-level clinical decision-making, while values of ≥ 0.70 are considered acceptable for instruments used at the group or research level.[14] Item-level reliability was evaluated using corrected item-total correlations (CITC), with a threshold of ≥ 0.30. CITC measures the correlation between an individual item and the total score of its proposed subscale, after removing that item’s own contribution to the score, thereby indicating how well each item discriminates between respondents with differing levels of the underlying construct; items falling below this threshold were considered candidates for review as they contribute weakly to subscale coherence. Floor and ceiling effects were additionally examined for each item by calculating the proportion of respondents endorsing the lowest and highest possible

response categories respectively, as a high proportion (conventionally > 15%) can indicate restricted variance that artificially attenuates reliability and item-total correlations, and can signal items that are poorly targeted to the study population. For construct validity, exploratory factor analysis (EFA) was conducted using Principal Axis Factoring (PAF) with Promax oblique rotation to assess the factorial structure of the Sinhala DLI. PAF was selected over principal component analysis because it models only the variance shared between items, making it more appropriate for identifying latent constructs underlying the observed item responses, and Promax oblique rotation was chosen, rather than an orthogonal rotation, because the subscales of the DLI were theoretically expected to be inter-correlated. Sampling adequacy and the suitability of the correlation matrix for factor analysis were assessed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, and the number of factors retained was guided by eigenvalues greater than 1, examination of the scree plot, and interpretability of the resulting factor solution. Collectively, these analyses provided complementary evidence for the validation of the Sinhala DLI: Cronbach's alpha and CITC addressed the reliability and internal coherence of the scale and its items, while EFA addressed the construct validity of the instrument by examining whether items grouped together in a manner consistent with, or meaningfully divergent from, the original six-domain DLI structure.

Ethical considerations

Ethical clearance was obtained from the Ethics Review Committee of CSTH. All participants provided written informed consent following review of an information sheet detailing the study purpose, procedures, voluntary participation, right to withdraw without consequence, absence of monetary incentives, and confidentiality arrangements. Data were handled exclusively by the research team, with electronic files password-protected and physical questionnaires stored under lock and key. Raw data will be destroyed five years after study completion in accordance with research governance guidelines. Interviews were conducted in a private, comfortable setting with minimal disruption to ward routines. Participants experiencing emotional distress during data collection were referred to a professional counsellor.

Results

Participant characteristics

A total of 302 participants were enrolled. The majority were aged between 61 and 70 years (36.8%), and sex was equally distributed (50.0% male, 50.0% female). Most participants were married (79.0%) and reported A/L qualification as their highest level of education (33.8%). The most common occupation was housewife (38.7%), and the majority were caring for a family member, most frequently a child of the participant (54.3%). Approximately half were new caregivers (< 6 months; 50.7%), and the majority were providing more than 120 hours of caregiving per week (59.3%). Most participants shared the caregiving burden with others (75.2%). Full sociodemographic characteristics are presented in Supplementary Table S1.

Descriptive statistics

Descriptive statistics for all 29 items are presented in Table 1. The mean total DLI score was 86.71 (SD = 18.11), with scores ranging from 52 to 139 across the sample (N = 302). At the item level, mean scores ranged from 1.50 (CK23, Community Knowledge) to 4.75 (HC5, Hands-on Care), reflecting wide variation in participants' engagement across different areas of death literacy.

Several items showed skewed distributions. Items C1 and HC5 exceeded acceptable limits for both skewness and kurtosis, indicating heavily compressed distributions at the ceiling. A ceiling effect occurs when an unusually high proportion of respondents (≥ 20%) endorse the maximum score. Four items showed clear ceiling effects: C1 (81.1%), HC5 (81.8%), HC6 (79.1%), and C3 (66.2%), all covering basic communication and physical caregiving tasks. Twelve items showed floor effects (≥ 20% scoring at minimum): CK23 (75.8%), HC8 (67.2%), FK18 (64.2%), FK15 (57.9%), FK20 (53.0%), SG28 (51.0%), FK17 (44.4%), FK19 (42.7%), FK14 (35.4%), CK22 (37.1%), SG27 (35.8%), and SG26 (34.8%), concentrated on the Factual Knowledge, Community Knowledge, and Support Groups subscales.

Table 1
Descriptive Statistics for All 29 Sinhala DLI Items (N = 302)

Item	Subscale	M	SD	Min	Max	Skewness	Kurtosis	Ceiling %	Floor %
C1	Communication	4.7	0.68	2	5	−2.35	4.75	81.1%*	0.00%
C2	Communication	3.14	1.69	1	5	−0.15	−1.64	36.40%	30.5%*
C3	Communication	4.34	1.08	1	5	−1.52	1.13	66.2%*	2.00%
C4	Communication	3.69	1.4	1	5	−0.64	−0.91	43.40%	10.90%
HC5	Hands-on Care	4.75	0.64	1	5	−3.42	13.93*	81.8%*	1.00%
HC6	Hands-on Care	4.71	0.6	3	5	−1.95	2.5	79.1%*	0.00%
HC7	Hands-on Care	4.04	1.17	1	5	−0.93	−0.31	51.3%*	3.00%
HC8	Hands-on Care	1.74	1.19	1	5	1.35	0.45	3.30%	67.2%*
EK9	Experiential Knowledge	4.01	1.09	1	5	−0.68	−0.73	46.00%	1.00%
EK10	Experiential Knowledge	2.53	1.33	1	5	0.43	−0.90	11.60%	30.5%*
EK11	Experiential Knowledge	3.87	1.34	1	5	−0.98	−0.31	44.70%	9.60%
EK12	Experiential Knowledge	2.41	1.11	1	5	0.45	−0.26	6.00%	25.5%*
EK13	Experiential Knowledge	4.06	1.21	1	5	−1.17	0.4	51.3%*	6.30%
FK14	Factual Knowledge	2.55	1.5	1	5	0.47	−1.27	16.90%	35.4%*
FK15	Factual Knowledge	2.08	1.47	1	5	0.98	−0.61	11.90%	57.9%*
FK16	Factual Knowledge	2.66	1.32	1	5	0.31	−1.15	10.30%	22.8%*
FK17	Factual Knowledge	2.28	1.36	1	5	0.57	−1.05	7.30%	44.4%*
FK18	Factual Knowledge	1.8	1.3	1	5	1.5	0.89	8.60%	64.2%*
FK19	Factual Knowledge	2.33	1.48	1	5	0.72	−0.99	13.90%	42.7%*

Note. Ceiling% = percentage scoring 5 (maximum); Floor% = percentage scoring 1 (minimum). * = ceiling or floor effect ≥ 20%, indicating potential item-level range restriction. Skewness and kurtosis thresholds: |skewness| > 2.0 and |kurtosis| > 7.0 are considered non-normal.

Item	Subscale	M	SD	Min	Max	Skewness	Kurtosis	Ceiling %	Floor %
FK20	Factual Knowledge	2.11	1.39	1	5	0.87	−0.66	8.90%	53.0%*
CK21	Community Knowledge	2.99	1.36	1	5	−0.22	−1.24	12.30%	21.9%*
CK22	Community Knowledge	2.35	1.27	1	5	0.42	−1.04	5.30%	37.1%*
CK23	Community Knowledge	1.5	1.02	1	5	2.1	3.42	3.00%	75.8%*
CK24	Community Knowledge	3.57	1.47	1	5	−0.65	−0.99	38.10%	16.90%
CK25	Community Knowledge	2.34	1.16	1	5	0.39	−0.90	3.00%	31.1%*
SG26	Support Groups	2.49	1.38	1	5	0.35	−1.31	7.60%	34.8%*
SG27	Support Groups	2.35	1.31	1	5	0.52	−1.10	5.60%	35.8%*
SG28	Support Groups	1.92	1.13	1	5	1.02	0.08	3.30%	51.0%*
SG29	Support Groups	3.41	1.15	1	5	−0.43	−0.52	18.50%	7.60%

Note. Ceiling% = percentage scoring 5 (maximum); Floor% = percentage scoring 1 (minimum). * = ceiling or floor effect ≥ 20%, indicating potential item-level range restriction. Skewness and kurtosis thresholds: |skewness| > 2.0 and |kurtosis| > 7.0 are considered non-normal.

Internal consistency reliability

Internal consistency reliability results are presented in Table 2. The full Sinhala DLI demonstrated good overall internal consistency (α = 0.892; standardised α = 0.895). At the subscale level, reliability varied considerably. The Factual Knowledge subscale demonstrated the strongest reliability (α = 0.872), followed by Experiential Knowledge (α = 0.765) and Support Groups (α = 0.736). The Communication (α = 0.698) and Community Knowledge (α = 0.688) subscales yielded marginal reliability. The Hands-on Care subscale demonstrated poor reliability (α = 0.512), primarily attributable to pronounced ceiling effects in items HC5 and HC6.

Table 2
Internal Consistency Reliability for the Sinhala DLI and Its Subscales (N = 302)

Subscale	Number of items	Scale M	Scale SD	Cronbach's α	α Std.	Avg. $\bar{r}$	Interpretation
Communication	4	15.88	3.67	0.698	0.701	0.4	Marginal
Hands-on Care	4	15.24	2.4	0.512	0.536	0.237	Poor
Experiential Knowledge	5	16.87	4.37	0.765	0.773	0.389	Acceptable
Factual Knowledge	7	15.8	7.38	0.872	0.875	0.492	Good
Community Knowledge	5	12.75	4.22	0.688	0.694	0.329	Marginal
Support Groups	4	10.17	3.72	0.736	0.741	0.397	Acceptable
Full Scale (29 items)	29	86.71	18.11	0.892	0.895	—	Good

Note. Interpretation criteria (Nunnally, 1978; George & Mallery, 2003): ≥ .90 Excellent; .80–.89 Good; .70–.79 Acceptable; .60–.69 Questionable; < .60 Poor. Avg. $\bar{r}$ = mean inter-item correlation; recommended range: .15–.50 (Clark & Watson, 1995).

Item-level reliability: corrected item-total correlations

Corrected item-total correlations (CITCs) and alpha-if-deleted values are reported in Supplementary Table S2. Of the 29 items, 22 met or exceeded the threshold of CITC ≥ 0.30. Seven items fell below the threshold: C1 (0.134), C3 (0.218), HC5 (0.056), HC6 (0.101), HC7 (0.248), EK9 (0.128), and SG29 (0.090). Despite their low CITCs, none of these items were removed, as their poor statistical performance likely reflects ceiling or floor compression rather than conceptual irrelevance within the Sri Lankan caregiving context.

Exploratory factor analysis

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .748, meeting the criterion for acceptability (Table 3). Bartlett's test of sphericity was statistically significant ($\chi^2(406) = 5523.81$, $p < .001$), confirming that the correlation matrix was suitable for factor extraction.

Table 3
KMO Measure and Bartlett's Test of Sphericity

Test	Result	Decision
Kaiser-Meyer-Olkin (KMO) measure	0.748	Acceptable — proceed with EFA
Bartlett's Test — Approx. χ^2	5523.81	
Bartlett's Test — df	406	
Bartlett's Test — p-value	< .001	Data not identity matrix

Note. KMO criterion: > .90 = Marvelous; .80–.89 = Meritorious; .70–.79 = Acceptable; .60–.69 = Mediocre; < .60 = Unacceptable.

Principal Axis Factoring with Promax oblique rotation was employed, consistent with the non-normal distributions observed at the item level and the theoretical expectation of correlated factors. Five factors with eigenvalues exceeding 1.0 were identified from the reduced correlation matrix, and the scree plot confirmed a clear elbow between factors five and six. Together, the five factors explained 53.20% of the total variance (Table 4).

Table 4
Total Variance Explained — 5-Factor PAF with Promax Rotation (N = 302)

Factor	Eigenvalue	% Variance	Cumulative %	Rotation SS	Interpretation
1	7.685	26.50%	26.50%	5.949	Factual Knowledge
2	3.697	12.75%	39.25%	5.387	Social Support / Networks
3	1.774	6.12%	45.37%	5.159	Mixed Knowledge
4	1.236	4.26%	49.63%	3.292	Practical Care Competence
5	1.037	3.58%	53.20%	2.821	Experiential Knowledge

Note. Only extracted factors (eigenvalue > 1.0 in PAF reduced correlation matrix) are shown. Rotation Sums of Squared Loadings reflect oblique (Promax) rotation and do not sum to total variance. Cumulative variance = 53.20% for 5-factor solution.

Pattern matrix and factor structure.

The rotated pattern matrix is presented in Table 5, and the inter-factor correlation matrix is presented in Table 6.

1. Factor 1 - Factual Knowledge.

Factor 1 demonstrated the most coherent and psychometrically robust structure, with high loadings from FK17 (0.825), FK15 (0.781), FK20 (0.764), and FK14 (0.737). Item HC7 also loaded substantially onto this

factor (0.686), suggesting conceptual overlap between practical hands-on care knowledge and formal factual knowledge in this population.

1. Factor 2 - Social Support and Community Engagement.

Factor 2 was anchored by exceptionally high loadings from SG27 (0.969) and SG26 (0.961), with additional contributions from SG28 (0.551), CK25 (0.669), and EK12 (0.412), indicating that the Support Groups domain reflects a broader social-community engagement construct in this sample.

1. Factor 3 - Mixed Knowledge Domain.

Factor 3 was characterised by moderate loadings from FK18 (0.713), CK23 (0.686), FK19 (0.641), CK24 (0.494), FK16 (0.486), and CK22 (0.379), reflecting poor discriminant validity between Factual Knowledge and Community Knowledge domains.

1. Factor 4 - Practical Care Competence.

Factor 4 brought together items from Communication (C3 = 0.748, C1 = 0.694) and Hands-on Care (HC6 = 0.713, HC5 = 0.526), along with EK9 (0.486), indicating that verbal communication around death and physical caregiving are not empirically distinguishable in this population.

1. Factor 5 - Experiential Knowledge.

Factor 5 was defined by EK11 (0.900) and EK13 (0.837), demonstrating excellent construct clarity, though anchored by only two items.

Communalities

Communalities estimated from the PAF solution are reported in Supplementary Table S3. The majority of items demonstrated adequate to high communalities (range: 0.306–0.877). Items HC5 (0.306), CK24 (0.341), and SG29 (0.348) showed the lowest communalities, corroborating concerns identified through reliability and CITC analyses.

Table 5
Rotated pattern matrix — 5-factor PAF with Promax rotation (N = 302)

Item	Subscale	F1 Fact. Know.	F2 Soc. Support	F3 Mixed Know.	F4 Pract. Care	F5 Exper. Know.	Communality.
C1	Comm				0.694*		0.537
C2	Comm						0.565
C3	Comm				0.748*		0.642
C4	Comm						0.558
HC5	HC				0.526*		0.306
HC6	HC				0.713*		0.522
HC7	HC	0.686*					0.387
HC8	HC						0.412
EK9	EK				0.486*		0.395
EK10	EK						0.816
EK11	EK					0.900*	0.877
EK12	EK		0.412*				0.546
EK13	EK					0.837*	0.841
FK14	FK	0.737*					0.719
FK15	FK	0.781*					0.721
FK16	FK			0.486*			0.625
FK17	FK	0.825*					0.685
FK18	FK			0.713*			0.675
FK19	FK			0.641*			0.575
FK20	FK	0.764*					0.503
CK21	CK						0.453
CK22	CK			0.379*			0.733
CK23	CK			0.686*			0.619

*Note. Loadings ≥ .32 are shown; loadings below this threshold are suppressed (—). Bold values indicate the primary loading for each factor. Subscales: Comm = Communication; HC = Hands-on Care; EK = Experiential Knowledge; FK = Factual Knowledge; CK = Community Knowledge; SG = Support Groups. F1 = Factual Knowledge; F2 = Social Support/Community Engagement; F3 = Mixed Knowledge Domain; F4 = Practical Care Competence; F5 = Experiential Knowledge. * = primary loading ≥ .32.*

Item	Subscale	F1 Fact. Know.	F2 Soc. Support	F3 Mixed Know.	F4 Pract. Care	F5 Exper. Know.	Communality.
CK24	CK			0.494*			0.341
CK25	CK		0.669*				0.535
SG26	SG		0.961*				0.708
SG27	SG		0.969*				0.781
SG28	SG		0.551*				0.586
SG29	SG						0.348

*Note. Loadings ≥ .32 are shown; loadings below this threshold are suppressed (—). Bold values indicate the primary loading for each factor. Subscales: Comm = Communication; HC = Hands-on Care; EK = Experiential Knowledge; FK = Factual Knowledge; CK = Community Knowledge; SG = Support Groups. F1 = Factual Knowledge; F2 = Social Support/Community Engagement; F3 = Mixed Knowledge Domain; F4 = Practical Care Competence; F5 = Experiential Knowledge. * = primary loading ≥ .32.*

Table 6
Inter-factor correlation matrix — Promax oblique rotation

F1	F1	F2	F3	F4	F5
	1.000	**0.042**	**0.223**	**-0.030**	**0.430**
F2	0.042	**1.000**	0.046	0.270	0.272
F3	0.223	0.046	**1.000**	0.170	0.250
F4	-0.030	0.270	0.170	**1.000**	0.380
F5	0.430	0.272	0.250	0.380	**1.000**

Note. Values represent correlations between the five oblique factors derived from the Promax rotation. F1 = Factual Knowledge; F2 = Social Support/Community Engagement; F3 = Mixed Knowledge Domain; F4 = Practical Care Competence; F5 = Experiential Knowledge.

Discussion

The findings demonstrate that the translated instrument possesses good overall internal consistency and an interpretable multidimensional factor structure, providing preliminary evidence that the Sinhala DLI is a suitable instrument for measuring death literacy within the Sri Lankan sociocultural context. Importantly, the study also reveals meaningful cultural variations in the way death literacy domains are organised, experienced, and expressed — variations that carry significant implications for public health palliative care policy and community-based end-of-life care initiatives in Sri Lanka.

Overall reliability and comparability with international adaptations

The Sinhala DLI demonstrated good overall internal consistency, with a Cronbach's alpha of 0.892 for the full 29-item scale. This level of reliability comfortably exceeds the conventional threshold of 0.70 widely recommended for research instruments intended for group-level analysis, and approaches the threshold of 0.90 recommended for instruments used in individual-level clinical decision-making.[14] The overall scale therefore functions coherently as a broad measure of death literacy, suggesting that the construct retains conceptual stability and internal coherence following cross-cultural adaptation into Sinhala. This finding is broadly consistent with international validation studies of the DLI, where overall reliability coefficients have generally exceeded 0.80 across the Australian, United Kingdom, Swedish, and Chinese adaptations.[1, 2, 6, 7]

A more detailed critical comparison against the original Australian DLI and other international and Asian adaptations situates the Sinhala DLI's psychometric performance further within this evidence base. In the original Australian development and validation study, subscale-level alpha coefficients ranged from 0.818 to 0.947, establishing the benchmark against which subsequent cultural adaptations have been judged.[1, 3] Internationally, the UK adaptation reported an overall alpha of 0.927 (subscales 0.794–0.904),[2] the Swedish DLI-S an overall alpha of 0.94 (subscales 0.81–0.92),[7] and the original Chinese translation an overall alpha of 0.94 (subscales 0.76–0.97).[6] Within Asia specifically, the Turkish validation of the original 29-item DLI reported an overall alpha of 0.90,[15] and a more recent validation of the revised DLI-R in a Chinese population reported an overall alpha of 0.92, with a five-factor exploratory structure accounting for 65.06% of variance — closely mirroring both the number of factors (five) and, to a lesser extent, the proportion of variance explained (53.20%) observed for the Sinhala DLI in the present study.[16] Against this backdrop, the Sinhala DLI's overall alpha of 0.892, while marginally lower than the values reported in these other adaptations, remains broadly consistent with the range established across the original tool and its international and Asian counterparts, and its five-factor structure aligns more closely with the pattern observed in the Chinese DLI-R than with the original six-domain Australian model. This convergence with another Asian, collectivist-culture adaptation lends further support to the interpretation that the restructuring observed in the present study reflects genuine cultural patterning of death literacy domains within Asian caregiving contexts, rather than a measurement artefact specific to the Sinhala translation.

Subscale-level reliability and cultural variability

Reliability at the subscale level varied substantially, however, revealing important patterns of cultural consistency and divergence in how specific dimensions of death literacy are organised and expressed within the Sri Lankan context. The Factual Knowledge domain demonstrated the strongest subscale-level psychometric performance, followed by Experiential Knowledge and Support Groups. In contrast, the Hands-on Care subscale demonstrated poor internal consistency, while the Communication and Community Knowledge subscales showed only marginal reliability. These differential findings are theoretically significant because they suggest that some dimensions of death literacy may be relatively culturally stable constructs, whereas others are strongly context-dependent and shaped by local social norms, caregiving practices, institutional infrastructure, and the specific configuration of end-of-life care systems within a given society. A comparable pattern of subscale variability has been noted across

international adaptations of the DLI, where overall scale reliability has remained robust whilst subscale performance has varied considerably across cultural settings.[2, 6, 12]

The lower reliability observed specifically within the Hands-on Care subscale appeared to result primarily from pronounced ceiling effects in items relating to feeding, bathing, and providing physical comfort to dying persons. When a substantial proportion of respondents endorse the highest possible response category across multiple items within a scale, variance is artificially compressed, attenuating the inter-item correlations that underpin internal consistency coefficients such as Cronbach's alpha, a well-recognised psychometric phenomenon in populations with high levels of the target attribute.[17] This finding is not without precedent in DLI validation research. A comparable ceiling effect was identified in the Hands-on Care subscale in the Chinese validation of the DLI, where this subscale recorded the highest mean scores across all domains, interpreted as reflecting participants' existing confidence and competence in performing physical caregiving tasks.[6] That both the Chinese and Sri Lankan samples, despite their distinct cultural and religious frameworks, exhibited ceiling effects in this domain points toward a broader pattern in which practical, embodied caregiving competence may be well-developed in collectivist, family-centred societies regardless of formal palliative care infrastructure, a finding with important implications for how hands-on care items are interpreted in such cultural contexts.

Rather than indicating item failure or conceptual misalignment, these ceiling effects in the Sri Lankan context more plausibly reflect the deep cultural normalisation of family caregiving within Sri Lankan society. The model of providing physical care to ailing and dying relatives within the home is not only normative in Sri Lanka but is actively reinforced through intergenerational transmission, with many adult children having grown up directly observing and participating in the care of elderly or ill relatives within multigenerational households.[18, 19] These caregiving obligations are further reinforced by the Theravada Buddhist tradition that shapes moral life for the majority of the Sri Lankan population, within which caring for the sick and elderly is understood not merely as a familial duty but as a meritorious act, a form of generosity and moral conduct that generates spiritual merit for the caregiver [20] Within this moral framework, caregiving tasks such as feeding and bathing a dying relative are not experienced as technically specialised activities requiring formal training but as natural expressions of filial piety and religious virtue. Consequently, the high endorsement of Hands-on Care items is more appropriately interpreted as reflecting genuine, culturally embedded familiarity with practical end-of-life caregiving than as a measurement artefact or item redundancy.

This interpretation is theoretically consistent with public health palliative care frameworks that recognise caregiving competence can emerge organically through community participation and lived experience rather than through formal professional training.[1, 4] Horsfall et al.'s foundational empirical work demonstrated that death literacy develops through the experience of informal caring networks, and that as individuals participate in caregiving relationships, those networks grow in number and relational intensity, strengthening community capacity to care.[5] The present findings suggest that Sri Lankan family caregivers may already embody precisely this form of community-embedded caregiving capacity,

constituting a significant existing social resource that public health palliative care initiatives could seek to recognise, support, and further build upon.

Floor effects and formal system literacy

The descriptive statistics further reinforce and extend these interpretations. Whilst communication and practical caregiving items demonstrated marked ceiling effects, items related to legal processes, death-planning documentation, palliative care access, funeral systems, and support groups demonstrated substantial floor effects, with a large proportion of participants endorsing the lowest possible response categories. This asymmetric pattern of response distributions suggests that death literacy in the Sri Lankan context may be characterised by strong informal relational and caregiving competence, what might be described as community-embedded practical literacy, but relatively limited formal system literacy: the knowledge and skills required to navigate institutional, legal, and administrative structures surrounding end-of-life care.

These findings are likely to reflect genuine structural realities within Sri Lanka rather than psychometric deficiencies in the instrument itself. Formal palliative care services remain limited in coverage and geographic distribution across Sri Lanka, with specialist palliative care concentrated primarily in tertiary care settings in urban centres and largely absent from rural and semi-urban communities[12]. Public awareness regarding advance care planning, hospice and home-based palliative care services, community support organisations and bereavement services remains relatively underdeveloped compared with countries where the DLI was originally developed and validated.[1, 2] The legal frameworks governing death-related documentation, advance directives, and end-of-life decision-making are similarly unfamiliar to the general public in Sri Lanka, reflecting the nascent stage of policy development in this domain [11] From a public health perspective, the pronounced floor effects observed in these domains are therefore important not only as psychometric findings but as substantive evidence identifying specific areas where community education, service development, and health system strengthening are most urgently needed.

Factor structure and construct validity

The exploratory factor analysis yielded further evidence of both construct validity and culturally meaningful restructuring of the DLI's domain organisation. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.748) and significant Bartlett's test of sphericity confirmed that the correlation matrix was suitable for factor analysis.[21] Principal Axis Factoring with Promax rotation, chosen as methodologically appropriate given the non-normal response distributions of several items and the theoretical expectation of correlated factors identified a five-factor structure accounting for 53.20% of total variance. Although this structure did not fully replicate the original six-domain DLI configuration, the resulting factors were theoretically interpretable and culturally meaningful, and the proportion of variance explained is consistent with factor solutions reported in other DLI validation studies.[2, 6, 7]

The Factual Knowledge factor emerged as the strongest and most coherent domain, with items loading clearly and consistently onto a single factor. This suggests that knowledge regarding end-of-life systems, medical decision-making, and practical informational resources retains strong conceptual integrity within

the Sinhala context, and that factual knowledge about death and dying represents a relatively culture-independent dimension of death literacy. Similarly, the Experiential Knowledge factor demonstrated relatively clear construct organisation, supporting the understanding that lived experience of grief, caregiving, loss, and bereavement contributes a meaningfully distinct dimension to death literacy, one that is not reducible to factual or practical knowledge alone. These findings align with international validation studies demonstrating that experiential and factual domains are among the most structurally stable components of the DLI across cultural settings.[2, 6, 7]

A particularly important finding was the empirical merging of Communication and Hands-on Care items into a single broader practical caregiving competence factor, rather than the two separable dimensions posited in the original DLI framework. In the original Australian conceptualisation, communication about death and the dying process and practical hands-on caregiving are treated as conceptually distinct domains, reflecting a cultural context in which formal conversations about death, with healthcare providers, with family members, and with the dying person, are understood as a specialised communicative capacity that is separable from the physical acts of caregiving.[1] The present findings suggest that this conceptual distinction may not be emic to the Sri Lankan context. In Sri Lankan family caregiving relationships, communication about dying may occur primarily within and through caregiving interactions themselves, through presence, physical touch, and relational attunement, rather than as a formally constituted conversational practice separate from physical care. Emotional support, caregiving, presence, and communication may therefore function as a unified relational practice in this context rather than as distinct and separable behavioural competencies. This finding has important implications for the design of death literacy education and communication interventions in Sri Lanka, suggesting that communication skills training may be most effectively delivered within the context of practical caregiving support rather than as a standalone educational programme.

The blending of Factual Knowledge and Community Knowledge items within the third factor similarly suggests that Sri Lankan participants may not strongly differentiate between formal healthcare-system knowledge and knowledge derived from community[4], family, and religious networks. In collectivist caregiving cultures, practical understanding of dying and end-of-life care often arises organically through extended family networks, religious institutions, and community experience rather than exclusively through formal educational or health system pathways.[4] Within this epistemological framework, the boundary between formal and informal knowledge, between what one learns from a healthcare provider and what one absorbs through community and family life, may be considerably more permeable than in Western, individualised healthcare cultures. Consequently, informal and formal knowledge systems may become intertwined in everyday understandings of death and dying in ways that are not captured by the original DLI's conceptual distinction between these domains.

The Support Groups factor also warrants careful interpretation. Support group items clustered strongly together but simultaneously incorporated broader social and community support constructs beyond formal group-based services. This may indicate that in Sri Lanka, formal bereavement and caregiver support groups are not the primary mechanism through which emotional and practical support is

experienced or sought. Rather, such support appears to be embedded within extended family systems, neighbourhood relationships, religious communities, and informal social networks, which, within the compassionate communities framework, are precisely the social structures that effective public health palliative care seeks to activate and strengthen.[4]This finding may have direct implications for the design of community-based support interventions in Sri Lanka, suggesting that programmes aligned with existing informal support structures, religious networks, community organisations, and extended kin systems — may be more culturally acceptable and effective than programmes modelled on Western formal support group paradigms.

Item-level findings

Several items demonstrated low corrected item-total correlations and weak factor communalities, particularly items HC5, SG29, and CK24. Although these findings indicate limited statistical discrimination at the item level, removal of these items may not necessarily be appropriate at this stage of instrument development. Psychometric weakness at the item level may partly reflect cultural saturation, restricted variance arising from ceiling or floor effects, or contextual unfamiliarity with specific institutional structures rather than conceptual irrelevance of the underlying construct.[22] Highly familiar caregiving behaviours may generate ceiling compression that suppresses item-level correlations, while items referencing underdeveloped service structures may generate floor compression with comparable psychometric effects. Consequently, targeted item revision and cognitive retesting with diverse Sri Lankan community samples, rather than wholesale item deletion, is recommended as the appropriate response to these findings in future refinement studies.

Strengths and limitations

The present study has several important strengths. It represents the first Sinhala-language psychometric validation of the DLI and thus makes an original contribution to the international literature on cross-cultural death literacy assessment. The study employed a comprehensive psychometric evaluation approach encompassing internal consistency analysis, item-level diagnostics including corrected item-total correlations and communalities, systematic floor and ceiling effect assessment, and exploratory factor analysis with methodologically appropriate rotation. The sample size of 290 participants was adequate for exploratory factor analysis, and the use of Principal Axis Factoring with oblique rotation was appropriate given the distributional characteristics of the item-level data and the theoretical expectation of correlated factors. The rigorous translation and cultural adaptation process, conducted in accordance with established international guidelines [17], further strengthens confidence in the content validity of the adapted instrument.

Several limitations must nonetheless be acknowledged. First, the study relied exclusively on exploratory factor analysis, and therefore the stability and generalisability of the five-factor structure requires independent confirmation through confirmatory factor analysis in separate samples. Second, test-retest reliability was not formally assessed in the present study, limiting conclusions regarding the temporal stability of DLI scores in Sinhala-speaking populations, a particularly important consideration for a construct like death literacy, which may be susceptible to change following significant caregiving or

bereavement experiences. Third, recruitment from a single tertiary care hospital in Colombo may limit the representativeness of the sample with respect to the broader Sri Lankan population and may have resulted in overrepresentation of individuals with prior caregiving exposure or familiarity with healthcare settings. Fourth, convergent and discriminant validity were not formally assessed against external constructs in the present analysis; although measures such as the Fear of Death Scale and the Palliative Care Knowledge Test were administered, the formal validity analyses using these measures have not yet been reported, and their inclusion in subsequent reporting will be essential for establishing a comprehensive validity evidence base for the Sinhala DLI.

Implications for Public Health Palliative Care in Sri Lanka

Despite these limitations, the study provides important preliminary evidence supporting the utility of the Sinhala DLI as a research and evaluation tool in Sri Lanka. The findings suggest that death literacy within the Sri Lankan context may be fundamentally relational, caregiving-oriented, and community-embedded, reflecting a pattern of informal caring competence that has developed through cultural tradition, religious values, and lived intergenerational experience rather than through formal palliative care education. At the same time, the pronounced floor effects observed across domains relating to formal service navigation, legal planning, and institutional support structures identify critical gaps in formal system literacy that represent priority areas for public health intervention.

Sri Lanka's rapidly ageing population and the corresponding growth in the burden of chronic and terminal illness mean that the demand for comprehensive end-of-life care will increase substantially in the coming decades.[8, 9, 21] Against this backdrop, the Sinhala DLI provides a validated tool for assessing population-level death literacy, evaluating the outcomes of community-based palliative care interventions, and identifying subgroups most in need of targeted support. Future research should prioritise confirmatory factor analysis, test-retest reliability assessment, and the evaluation of known-group validity, examining, for example, whether DLI scores differ predictably across groups with varying caregiving experience, educational attainment, religious affiliation, and urban-rural residence. Longitudinal studies examining whether death literacy changes following participation in compassionate community programmes or community-based palliative care education would further strengthen the evidence base for public health palliative care policy in Sri Lanka.

Overall, the Sinhala DLI demonstrated good overall reliability and acceptable construct validity whilst revealing culturally meaningful restructuring of death literacy domains that reflects the specific social, cultural, and structural realities of end-of-life care in Sri Lanka. These findings contribute to the growing international evidence base demonstrating that death literacy is a psychometrically robust yet culturally sensitive construct, and underscore the importance of rigorous cross-cultural adaptation and validation when translating public health palliative care tools across diverse linguistic and sociocultural contexts.

Conclusions

This study presents the first translation, cultural adaptation, and psychometric validation of the Death Literacy Index for a Sinhala-speaking population, undertaken using a rigorous five-step cross-cultural adaptation methodology. The Sinhala DLI demonstrated good overall internal consistency (α = 0.892) and an interpretable, though partially restructured, five-factor solution accounting for 53.20% of total variance, providing acceptable evidence of construct validity. Although several domains demonstrated reliability comparable to the original Australian DLI and to its international and Asian adaptations, the observed restructuring, most notably the merging of Communication with Hands-on Care items, and of Factual with Community Knowledge items — indicates that the original six-domain model required meaningful cultural adaptation to function coherently within the Sri Lankan context rather than transferring unaltered across linguistic and cultural boundaries. These findings support the Sinhala DLI as a valid and reliable instrument for assessing death literacy among Sri Lankan caregivers and as a foundation for future research and programme evaluation, while underscoring that further psychometric refinement is required before the tool can be considered fully equivalent to the original DLI for cross-cultural comparison. Future work should prioritise confirmatory factor analysis to test the stability of the identified factor structure, assessment of test-retest reliability, evaluation of convergent and discriminant validity against established external constructs, and multi-site validation across more diverse Sri Lankan communities, to further strengthen the evidence base for the cultural adaptation and validation of the DLI in the Sri Lankan setting.

Abbreviations

DL
death literacy
DLI
Death Literacy Index
DLI-S
Swedish version of the Death Literacy Index
DLI-R
revised Death Literacy Index
EoL
end-of-life
PHPC
public health palliative care
CSTH
Colombo South Teaching Hospital
STV
subject-to-variable ratio
EFA
exploratory factor analysis
PAF
Principal Axis Factoring

KMO
Kaiser-Meyer-Olkin
CITC
corrected item-total correlation
SD
standard deviation
SPSS
Statistical Package for the Social Sciences
Comm
Communication subscale
HC
Hands-on Care subscale
EK
Experiential Knowledge subscale
FK
Factual Knowledge subscale
CK
Community Knowledge subscale
SG
Support Groups subscale.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Review Committee of the Colombo South Teaching Hospital and was conducted in accordance with its guidelines and the Declaration of Helsinki. Administrative permission was obtained from the Director, Colombo South Teaching Hospital. Written informed consent was obtained from all participants prior to data collection.

Consent for publication

Not applicable.

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Author Contribution

SS concepted the idea and designed the initial methodology. SS, NE, UR and CG contributed in design of the study, analysis and writing of the manuscript. SR engaged in data collection. All authors have read, edited and ratified this manuscript

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None

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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