



Psychometric Validation of the UCLA Loneliness Scale Version 3: Evidence for a Six-Factor Structure Among Science Teachers

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ABSTRACT

Purpose of the study: This study aimed to evaluate the construct validity and factor structure of the Indonesian version of the UCLA Loneliness Scale Version 3.

Methodology: A quantitative methodological validation design was conducted with 132 Indonesian science teachers selected through purposive sampling. The instrument was culturally adapted through forward translation, back translation, expert content validation, and pilot testing. Construct validity was examined using Exploratory Factor Analysis (EFA), including the Kaiser–Meyer–Olkin (KMO) measure, Bartlett's Test of Sphericity, Measure of Sampling Adequacy (MSA), and Principal Component Analysis (PCA) with Varimax rotation. Internal consistency was assessed using Cronbach's alpha.

Main Findings: The Indonesian version demonstrated satisfactory psychometric properties. The KMO value (0.795) and Bartlett's Test of Sphericity ($p < .001$) confirmed the suitability of the data for factor analysis. All items achieved MSA values and factor loadings above 0.50. EFA identified a six-factor structure, supporting the multidimensional nature of loneliness among Indonesian teachers and providing evidence of acceptable construct validity.

Novelty/Originality of this study: The findings indicate that the Indonesian version of the UCLA Loneliness Scale Version 3 is a valid and reliable instrument for assessing teacher loneliness. This study provides the first psychometric validation of the scale among Indonesian teachers. The validated instrument offers practical implications for educational psychology research, psychological assessment, and the development of interventions to promote teachers' psychological well-being.

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1. INTRODUCTION

Loneliness has emerged as a major mental health concern over the past few decades because of its far-reaching consequences for individual well-being and public health. As a psychological construct, loneliness influences how individuals perceive and evaluate the quality of their social relationships and the support they receive, often resulting in psychological distress and feelings of emotional emptiness [1], [2]. Both objective social isolation and the subjective experience of loneliness have been consistently identified as significant risk

factors for physical and mental health problems [3]–[5]. Consequently, loneliness has been recognized as a global public health threat affecting individuals across the lifespan, including children, adolescents, adults, and older adults [6]–[10]. Individuals experiencing loneliness are at greater risk of diminished physical and psychological well-being [11]–[13], as well as a wide range of adverse outcomes, including childhood social isolation, problematic alcohol use, depression, and other mental health problems during adolescence [14], [15]. These detrimental effects have been consistently documented across diverse cultural and geographical contexts [16]–[18].

Conceptually, loneliness is defined as an unpleasant subjective experience arising from a discrepancy between an individual's desired and actual social relationships [19]. When the fundamental need for social connectedness, acceptance, and interpersonal intimacy is not adequately fulfilled, individuals may experience loneliness even while being surrounded by others. Beyond compromising emotional well-being, loneliness has been associated with an increased risk of severe health conditions, including stroke, anxiety, dementia, depression, and suicide [20]. Furthermore, accumulating evidence suggests that loneliness contributes to higher rates of morbidity and mortality [5], these findings underscore the importance of employing psychometrically robust instruments to accurately assess loneliness in both research and professional psychological practice [21]–[23].

Given the substantial impact of loneliness on multiple aspects of human functioning, the availability of valid and reliable assessment instruments is essential. Several instruments have been developed to measure perceived loneliness, including the UCLA Loneliness Scale [24], [25], *De Jong Gierveld Loneliness Scale* [26], *Loneliness and Aloneness Scale for Children and Adolescents* [27], *Social and Emotional Loneliness Scale for Adults* [28], serta *Perth-A Loneliness Scale* [29]. Among these measures, the UCLA Loneliness Scale has become the most widely used instrument in psychological research because of its strong theoretical foundation and well-established psychometric properties across diverse populations and cultural settings [30], [31].

The original 20-item UCLA Loneliness Scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of .96, and satisfactory test–retest reliability over a two-month interval ($r = .73$) [24]. Since its development, the instrument has been translated, adapted, and validated in numerous countries, demonstrating its cross-cultural applicability. To improve assessment efficiency while maintaining satisfactory psychometric quality, several shortened versions have subsequently been developed, including the 11-item version [32], 10 item [33], 6 item [31], and 3 item [34]. Most of these abbreviated forms have demonstrated satisfactory reliability and validity [35], [36], although many have primarily been validated among older adults or other specific populations.

Research attention has increasingly focused on loneliness among teachers because they are exposed to multiple occupational stressors that may increase the risk of social disconnection and psychological distress. Teachers frequently encounter heavy workloads, administrative demands, role conflicts, limited professional support, and emotional exhaustion, all of which may contribute to feelings of loneliness despite working in highly interactive environments. Teacher loneliness has been associated with reduced psychological well-being, lower job satisfaction, increased burnout, and decreased work engagement, ultimately affecting teaching effectiveness and educational quality. Given the crucial role teachers play in students' academic and socio-emotional development, accurately assessing loneliness among teachers is essential for promoting teacher well-being and sustaining high-quality education [37]–[42]. Conversely, difficulties in establishing positive interpersonal relationships are associated with lower life satisfaction and greater feelings of loneliness [43].

Teachers play a central role in determining educational quality, student engagement, and learning outcomes. Previous studies have demonstrated that teacher performance is influenced not only by instructional competence but also by psychosocial and organizational factors, including quality of work life and workplace conditions. Therefore, understanding teachers' psychological well-being, including loneliness, is essential for maintaining effective teaching and sustainable educational quality [44], [45].

Despite the widespread use of the UCLA Loneliness Scale across different countries and populations, evidence regarding its psychometric properties among teachers remains limited, particularly in non-Western cultural contexts. Most previous validation studies have focused on adolescents, university students, older adults, or community populations, whereas teachers have received comparatively little attention. This represents an important research gap because teachers experience unique occupational demands, including heavy workloads, professional isolation, and increasing psychological pressures, all of which may influence the manifestation and measurement of loneliness. Consequently, psychometric evidence obtained from other populations cannot be assumed to be directly applicable to teachers. This gap is particularly important because teachers constitute a professional group with distinctive occupational demands, interpersonal responsibilities, and organizational environments that may shape the experience of loneliness differently from other populations. Without a psychometrically validated instrument specifically designed for teachers, the accuracy of psychological assessment and subsequent intervention planning may be compromised.

In Indonesia, studies examining teacher loneliness have primarily investigated its association with psychological well-being, job satisfaction, burnout, or work engagement, while rigorous validation of loneliness

measurement instruments remains scarce. To the best of our knowledge, no previous study has comprehensively evaluated the construct validity and underlying factor structure of the Indonesian version of the UCLA Loneliness Scale Version 3 specifically among teachers using Exploratory Factor Analysis (EFA). The absence of a psychometrically validated instrument limits the accuracy of psychological assessment and reduces the comparability of findings across educational settings.

The urgency of this study is reinforced by the increasing psychological challenges experienced by science teachers, including work-related stress, professional isolation, and emotional exhaustion, which may adversely affect their well-being and teaching effectiveness. Despite the growing recognition of these challenges, the absence of a culturally validated loneliness instrument for Indonesian teachers limits researchers and practitioners in accurately identifying teachers who require psychological support and developing evidence-based interventions.

To address this methodological limitation, the present study conducts a comprehensive psychometric evaluation of the Indonesian version of the UCLA Loneliness Scale Version 3. By examining its construct validity, internal consistency reliability, and underlying factor structure, this study seeks to provide a culturally appropriate measurement instrument that can accurately assess loneliness among teachers. Therefore, the novelty of this study lies in providing the first psychometric validation of the Indonesian version of the UCLA Loneliness Scale Version 3 specifically for teachers. Unlike previous validation studies conducted among adolescents, university students, older adults, and community populations, this study focuses on teachers as a unique occupational group with distinct psychosocial characteristics. Accordingly, the objective of this study is to evaluate the construct validity, internal consistency reliability, and underlying factor structure of the adapted instrument to determine its suitability for assessing teacher loneliness within the Indonesian cultural context.

Accordingly, this study addresses the following research questions: (1) Does the Indonesian version of the UCLA Loneliness Scale Version 3 demonstrate satisfactory construct validity for assessing loneliness among science teachers? (2) What underlying factor structure emerges from the adapted instrument when administered to Indonesian science teachers? (3) Does the adapted instrument demonstrate satisfactory internal consistency reliability for use in educational psychology research and professional psychological assessment?

2. RESEARCH METHOD

This study employed a quantitative methodological research design to evaluate the psychometric properties of the Loneliness Scale among teachers. Methodological research is intended to examine the development, adaptation, and validation of measurement instruments to ensure that they demonstrate satisfactory validity and reliability within a specific target population [46]. Accordingly, the present study assessed the instrument through a comprehensive psychometric evaluation, including content validity, construct validity, and internal consistency reliability, to determine its suitability for measuring loneliness among teachers.

The study involved 132 teachers representing multiple educational levels in Bekasi Regency, Indonesia. Participants were recruited using a purposive sampling technique, which enables researchers to select respondents who meet predefined characteristics relevant to the research objectives [47]. Eligibility criteria required participants to (1) be actively employed as teachers, (2) have a minimum teaching experience of one year, (3) voluntarily provide written informed consent prior to participation, and (4) possess sufficient comprehension to complete the research questionnaire independently.

The minimum sample size was determined based on psychometric recommendations suggesting five to ten respondents per observed item for exploratory factor analysis [48]. Given the 20-item instrument, a minimum sample of 100–200 participants was considered appropriate. The final sample consisted of 132 teachers (6.6 participants per item), satisfying these recommendations. Furthermore, simulation studies have demonstrated that sample sizes above 100 generally provide adequate statistical power for recovering stable factor structures when communalities and factor loadings are moderate to high [49], [50]. Therefore, the sample size was considered sufficient for the intended psychometric analyses.

Loneliness was measured using an Indonesian adaptation of the UCLA Loneliness Scale Version 3 developed [33]. Instrumen ini mengukur dua dimensi utama kesepian, yaitu *emotional isolation* and *social isolation*. The instrument is designed to assess two conceptual dimensions of loneliness, namely emotional isolation and social isolation. It comprises 20 statements rated on a four-point Likert scale, with response options ranging from 1 (Very Often) to 4 (Never). Psychometric evaluation demonstrated excellent internal consistency, as reflected by a Cronbach's alpha coefficient of 0.963. This result indicates that the instrument possesses a high degree of reliability and is appropriate for assessing loneliness among teachers. Cronbach's alpha coefficients in [33] study ranged from 0.890 to 0.940. The detailed reliability results are presented in Table 1.

Table 1. Research Instrument

Dimension	Modified Item Code	Code	Original Item	Adapted Item
Emotional Isolation	X1	IE1	How often do you feel that you are “in tune” with the people around you	<i>Seberapa sering Anda merasa terhubung atau selaras dengan orang-orang di sekitar Anda</i>
	X2	IE2	How often do you feel that there are people who really understand you	<i>Seberapa sering Anda merasa bahwa ada seseorang yang benar-benar memahami Anda</i>
	X3	IE3	How often do you feel that there is no one you can turn to	<i>Seberapa sering Anda merasa tidak memiliki seseorang yang dapat Anda mintai bantuan</i>
	X4	IE4	How often do you feel that your relationships with others are not meaningful	<i>Seberapa sering Anda merasa hubungan Anda dengan orang lain terasa kosong atau tidak bermakna</i>
	X5	IE5	How often do you feel that no one really knows you well	<i>Seberapa sering Anda merasa tidak ada seorang pun yang benar-benar mengenal Anda</i>
	X6	IE6	How often do you feel that you have a lot in common with the people around you	<i>Seberapa sering Anda merasa memiliki banyak kesamaan dengan orang-orang di sekitar Anda</i>
	X7	IE7	How often do you feel that you are no longer close to anyone	<i>Seberapa sering Anda merasa tidak lagi dekat dengan siapa pun</i>
	X8	IE8	How often do you feel that your interests and ideas are not shared by those around you	<i>Seberapa sering Anda merasa bahwa minat dan ide Anda tidak dipahami atau dibagikan oleh orang-orang di sekitar Anda</i>
	X9	IE9	How often do you feel close to people	<i>Seberapa sering Anda merasa dekat secara emosional dengan orang lain</i>
	X10	IE10	How often do you feel that people are around you but not with you	<i>Seberapa sering Anda merasa bahwa meskipun ada orang di sekitar Anda, mereka tidak benar-benar bersama Anda</i>
	X11	IE11	How often do you feel that there are people you can talk to	<i>Seberapa sering Anda merasa memiliki seseorang yang bisa diajak bicara secara terbuka</i>
	X12	IE12	How often do you feel that there are people you can turn to?	<i>Seberapa sering Anda merasa memiliki seseorang yang bisa Anda andalkan saat membutuhkan bantuan</i>
Social Isolation	X13	IS1	How often do you feel alone	<i>Seberapa sering Anda merasa sendirian meskipun ada orang lain di sekitar Anda</i>
	X14	IS2	How often do you feel part of a group of friends	<i>Seberapa sering Anda merasa menjadi bagian dari sekelompok teman</i>
	X15	IS3	How often do you feel outgoing and friendly	<i>Seberapa sering Anda merasa ramah dan mudah bergaul dengan orang lain</i>
	X16	IS4	How often do you feel that you lack companionship	<i>Seberapa sering Anda merasa kekurangan teman dekat</i>
	X17	IS5	How often do you feel left out	<i>Seberapa sering Anda merasa tersisih dari pergaulan</i>
	X18	IS6	How often do you feel isolated from others	<i>Seberapa sering Anda merasa terisolasi dari orang lain</i>
	X19	IS7	How often do you feel you can find companionship when you want it	<i>Seberapa sering Anda merasa dapat menemukan teman ketika Anda membutuhkannya</i>
	X20	IS8	How often do you feel shy	<i>Seberapa sering Anda merasa malu saat berinteraksi dengan orang lain</i>

The Indonesian version of the UCLA Loneliness Scale Version 3 was developed following internationally recognized guidelines for cross-cultural adaptation of psychological instruments. The adaptation process consisted of forward translation from English into Indonesian by bilingual experts, followed by back translation into English by an independent translator to ensure semantic, conceptual, and linguistic equivalence between the translated and original versions. The translated instrument was subsequently reviewed by the research team to resolve discrepancies and improve cultural appropriateness while preserving the conceptual meaning of each item. Minor linguistic modifications were made to enhance clarity and relevance for Indonesian teachers. The final adapted instrument retained the original 20-item format and employed a four-point Likert response scale ranging from 1 (Very Often) to 4 (Never), consistent with the original measurement framework.

Before empirical data collection, the adapted instrument underwent a content validity evaluation to determine the relevance and clarity of each item. Two experts with extensive experience in educational psychology and psychometric assessment independently reviewed all items based on language clarity, cultural appropriateness, content relevance, and representativeness of the loneliness construct [51]. The degree of agreement between experts was quantified using Aiken's V coefficient. Following the recommendations of [52] and [53], items with an Aiken's V value of 0.80 or higher were considered acceptable. The evaluation yielded an Aiken's V coefficient of 1.00 for all items, indicating perfect agreement between experts regarding the relevance, clarity, and representativeness of the adapted instrument.

Data were collected using both paper-based and online questionnaires distributed to teachers who met the predefined inclusion criteria. The questionnaire consisted of two sections: (1) participants' demographic information, including gender, age, teaching experience, and educational level, and (2) the Indonesian version of the UCLA Loneliness Scale Version 3 comprising 20 items. Before participation, all respondents received an explanation regarding the objectives of the study, research procedures, confidentiality of personal information, and their right to withdraw from the study at any time without consequences. Written informed consent was obtained from all participants prior to data collection. Participants completed the questionnaire independently based on their personal experiences and perceptions. All completed questionnaires were used exclusively for research purposes and were stored confidentially to ensure participants' privacy and data protection.

Statistical analyses were performed using IBM SPSS Statistics version 23. The analysis was construct validity was examined through Exploratory Factor Analysis (EFA). Prior to factor extraction, sampling adequacy was evaluated using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. Item-level sampling adequacy was assessed using the Measure of Sampling Adequacy (MSA), with values greater than 0.50 considered acceptable. Factor extraction was conducted using Principal Component Analysis (PCA), followed by Varimax orthogonal rotation to obtain a more interpretable factor structure. Factors with eigenvalues greater than 1.00 were retained, and items with factor loadings of 0.50 or higher were considered acceptable indicators of their respective latent constructs [48], [54].

Third, item validity was evaluated using corrected item-total correlation based on Pearson's product-moment correlation. In accordance with established psychometric guidelines [53], items with corrected item-total correlation coefficients exceeding 0.30 were considered valid. Finally, internal consistency reliability was assessed using Cronbach's alpha coefficient. Alpha values of 0.70 or higher indicated acceptable reliability, whereas coefficients above 0.80 reflected good internal consistency [55]. These analytical procedures were conducted to comprehensively evaluate the psychometric properties of the Indonesian version of the UCLA Loneliness Scale Version 3 for use among teachers.

3. RESULTS AND DISCUSSION

3.1 Keiser-Meyers-Oklin (KMO) Measure of Sampling Adequacy

Table 2 presents the results of the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy, which was performed to determine whether the data were suitable for factor analysis. The KMO statistic provides an indication of sampling adequacy, with higher values reflecting stronger intercorrelations among the observed variables and greater appropriateness for factor extraction.

Table 2. Keiser-Meyers-Oklin (KMO) Measure of Sampling Adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	1854.213
	df	190
	Sig.	.000

As presented in Table 2, the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy yielded a value of 0.795, exceeding the recommended threshold of 0.50, thereby indicating that the sample was adequate

for factor analysis. Furthermore, Bartlett's Test of Sphericity was statistically significant (χ^2 , $p < .001$), demonstrating that the correlation matrix was appropriate for factor extraction. The anti-image correlation matrix was subsequently examined through the Measure of Sampling Adequacy (MSA) values for individual items. All 20 items produced MSA values greater than 0.50, indicating that each item met the minimum criterion for inclusion in the factor analysis. Consequently, no items were excluded, and all 20 items were retained for subsequent psychometric analyses.

The extracted factor structure was then interpreted using the rotated component matrix. The distribution of items across the identified factors is presented in the following table, which illustrates the empirical grouping of indicators based on their factor loadings.

Table 3. Rotated Component Matrix^a

	Rotated Component Matrix ^a					
	Component					
	1	2	3	4	5	6
X1			.535			
X2						.920
X3			.743			
X4			.778			
X5			.639			
X6		.639				
X7	.674					
X8				.770		
X9		.500				
X10	.606					
X11		.854				
X12		.853				
X13				.654		
X14					.923	
X15					.903	
X16	.719					
X17	.856					
X18	.848					
X19		.706				
X20	.659					

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 11 iterations.

Based on the rotated factor solution presented in Table 3, the item classifications were reorganized according to their empirical factor loadings to provide a clearer representation of the underlying factor structure. Accordingly, a revised classification of the indicators is presented in Table 4, reflecting the grouping of items derived from the factor analysis.

Table 4. Classification of the indicators

Factor	Adapted Item Code	Factor Loading
Factor 1	X7	0.674
	X10	0.606
	X16	0.719
	X17	0.856
	X18	0.848
	X20	0.659
Factor 2	X6	0.639
	X9	0.500
	X11	0.854
	X12	0.853
	X19	0.706
Factor 3	X1	0.535
	X3	0.743

Factor	Adapted Item Code	Factor Loading
Factor 4	X4	0.778
	X5	0.639
	X8	0.770
	X13	0.654
Factor 5	X14	0.923
	X15	0.903
Factor 6	X2	0.920

As presented in Table 4, the first factor comprised six items (X7, X10, X16, X17, X18, and X20), with factor loadings ranging from 0.606 to 0.856. These loading values indicate that the six items exhibited strong associations with the underlying latent construct represented by this factor. Among them, Item X17 demonstrated the highest loading (0.856), suggesting that it was the strongest indicator of the first factor.

The second factor consisted of five items (X6, X9, X11, X12, and X19), with factor loadings ranging from 0.500 to 0.854. Although Item X9 produced a loading of 0.500, which corresponds to the minimum acceptable threshold, it was retained because it satisfied the recommended criterion for factor retention in exploratory factor analysis. The third factor was represented by four items (X1, X3, X4, and X5), with factor loadings ranging from 0.535 to 0.778. These values indicate that all four items made meaningful contributions to the latent construct represented by this factor. The fourth factor included two items, X8 and X13, with factor loadings of 0.770 and 0.654, respectively, reflecting satisfactory relationships with the corresponding latent dimension. The fifth factor consisted of two items, X14 and X15, which exhibited exceptionally high factor loadings of 0.923 and 0.903, respectively. These findings indicate that both items were highly representative of the fifth latent construct. The sixth factor contained a single item (X2) with a factor loading of 0.920, indicating a very strong association with the extracted factor. Overall, the exploratory factor analysis retained all 20 items, which were distributed across six latent factors with factor loadings ranging from 0.500 to 0.923. The consistently high loading coefficients demonstrate that the retained items adequately represented their respective factors, providing empirical evidence to support the construct validity of the adapted loneliness scale.

The results of the Principal Component Analysis (PCA) are summarized in Table 5. Based on the Kaiser criterion (eigenvalue > 1), six factors were retained in the final measurement model. The first factor yielded an eigenvalue of 7.645, accounting for 38.225% of the total variance. The second through sixth factors produced eigenvalues of 2.457, 1.638, 1.261, 1.143, and 1.079, explaining an additional 12.284%, 8.189%, 6.307%, 5.715%, and 5.395% of the variance, respectively. Collectively, these six factors explained a substantial proportion of the total variance in the observed data, supporting the multidimensional structure of the adapted UCLA Loneliness Scale. A detailed summary of the variance explained by each factor is presented in Table 5.

Tabel 5. Interpretasi Total Variance Explained

Factor	Eigenvalue	Variance%	Cumulative %
1	7.645	38.225	38.225
2	2.457	12.284	50.508
3	1.638	8.189	58.697
4	1.261	6.307	65.005
5	1.143	5.715	70.720
6	1.079	5.395	76.115

Figure 1 presents the Screen Plot of the adapted Loneliness Scale. The scree plot was examined to determine the optimal number of factors to retain by identifying the point at which the eigenvalues begin to level off (the *elbow*). Consistent with the Kaiser criterion, the plot indicates that the first six factors have eigenvalues greater than 1.0, after which the slope gradually flattens, suggesting that the remaining factors contribute relatively little to explaining the total variance. These findings provide additional empirical support for retaining a six-factor solution, consistent with the results of the Principal Component Analysis (PCA).

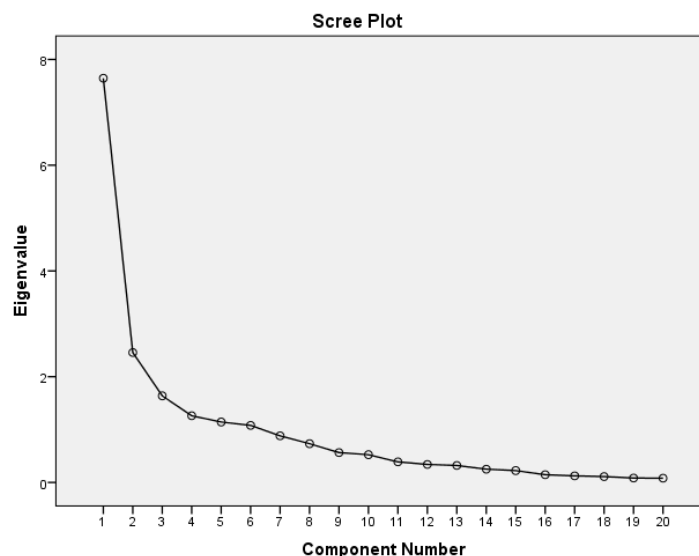


Figure 1. Screen Plot

Following Varimax rotation, the factor solution presented in Table 3 produced a clearer and more interpretable factor structure by maximizing the variance of factor loadings across the extracted dimensions. All retained items demonstrated factor loadings greater than 0.50, indicating satisfactory associations with their respective latent factors. These results suggest that each indicator contributed meaningfully to the measurement of the loneliness construct and provided adequate evidence of construct validity. The absence of items with loadings below the recommended threshold further supports the robustness of the adapted instrument for assessing loneliness among teachers.

The overall factor analytic results further confirmed the psychometric adequacy of the adapted scale. The Kaiser–Meyer–Olkin (KMO) value of 0.795 exceeded the recommended minimum criterion of 0.50, while Bartlett's Test of Sphericity was statistically significant ($p < .001$), indicating that the correlation matrix was appropriate for factor analysis. According to [48], KMO values above 0.70 reflect good sampling adequacy, whereas a significant Bartlett's test indicates sufficient inter-item correlations to justify the extraction of latent factors. These findings are consistent with the systematic review conducted by [31] which reported that adaptations of the UCLA Loneliness Scale with KMO values above 0.70 generally exhibit stable and valid factor structures across diverse populations. Therefore, the present findings provide empirical support for the suitability of the adapted instrument as a valid measure of loneliness among teachers.

The Measure of Sampling Adequacy (MSA) analysis further demonstrated that all items exceeded the recommended threshold of 0.50, indicating that none of the items required removal during the preliminary stage of factor analysis. According to [56], satisfactory MSA values indicate that each item shares sufficient variance with the remaining items and contributes meaningfully to the measurement of the underlying construct. The present findings therefore suggest that all 20 items adequately represented the construct of loneliness and collectively captured its variance within the teacher population. These results are consistent with the study by [57] who evaluated the Indonesian adaptation of the UCLA Loneliness Scale using the Rasch measurement model and reported that well-fitting items substantially enhanced the overall precision and construct representation of the instrument. Consequently, retaining all items in the present study provides additional evidence that the adapted scale possesses comprehensive indicator representation for assessing loneliness among teachers.

The Rotated Component Matrix further confirmed the robustness of the instrument, with all items exhibiting factor loadings ranging from 0.606 to 0.923, well above the recommended minimum criterion of 0.50 [48], these findings indicate that each indicator demonstrated a strong relationship with its corresponding latent factor and contributed meaningfully to the overall measurement model. Notably, Items X14 (0.923), X15 (0.903), and X2 (0.920) displayed exceptionally high factor loadings, suggesting that these items are particularly strong indicators of their respective dimensions of loneliness. These results are consistent with the findings of [58] who compared the psychometric performance of the short and long versions of the UCLA Loneliness Scale and reported that items with higher factor loadings contributed more substantially to construct representation and measurement accuracy. Taken together, these findings provide further evidence that the adapted instrument demonstrates strong construct validity and is appropriate for measuring loneliness among teachers. These findings directly answer the first research question by demonstrating that the Indonesian version of the UCLA

Loneliness Scale Version 3 possesses satisfactory construct validity for assessing loneliness among teachers. The combination of acceptable KMO, MSA, Bartlett's Test of Sphericity, and factor loadings indicates that the instrument adequately represents the underlying loneliness construct within the Indonesian educational context.

The most notable finding of the present study is the identification of a six-factor structure underlying teachers' experiences of loneliness. This finding suggests that loneliness should not be conceptualized as a unidimensional construct but rather as a multidimensional phenomenon comprising several interrelated dimensions. The emergence of six distinct factors indicates that teachers experience loneliness in diverse ways, reflecting the complexity of their personal and professional lives. These findings are consistent with the meta-analytic factor analysis conducted by [59] which demonstrated that the factor structure of the UCLA Loneliness Scale varies across populations depending on cultural background, social context, and respondent characteristics. Their study concluded that variations in factor structures are expected because loneliness is shaped by contextual and environmental influences rather than representing a universally fixed construct. Therefore, the multidimensional structure identified in the present study provides further empirical evidence that teachers' experiences of loneliness are influenced by a unique combination of personal, interpersonal, and occupational factors.

The identification of a six-factor structure extends the current understanding of teacher loneliness by demonstrating that the construct is more complex than a single-dimensional psychological experience. Rather than representing merely the absence of social relationships, loneliness among teachers appears to encompass multiple interrelated emotional, interpersonal, and occupational dimensions that reflect the complexity of teachers' professional and personal experiences. This finding indicates that psychological assessment of loneliness in educational settings should adopt a multidimensional perspective to obtain a more comprehensive understanding of teachers' psychological well-being. Furthermore, the identified six-factor structure provides empirical evidence regarding the underlying dimensionality of the adapted instrument, suggesting that teacher loneliness is influenced by both cultural and occupational contexts. This finding is consistent with previous psychometric research indicating that the factor structure of loneliness varies across populations and cultural settings, reinforcing the view that loneliness should not be conceptualized as a universally fixed construct. Consequently, the present findings contribute to the growing body of evidence supporting the multidimensional nature of teacher loneliness and highlight the importance of validating psychological instruments within specific cultural and professional contexts.

In addition to construct validity, the adapted instrument demonstrated satisfactory internal consistency reliability (Cronbach's alpha coefficient of 0.963), indicating that the items consistently measure the underlying construct of teacher loneliness. High internal consistency suggests that the instrument produces stable and dependable measurements, supporting its use in both educational psychology research and professional psychological assessment. This finding addresses the third research question and is consistent with previous validation studies reporting that the UCLA Loneliness Scale exhibits strong reliability across different cultural settings. The satisfactory internal consistency further indicates that the instrument provides stable and consistent measurements of teacher loneliness across respondents. Reliable measurement is essential because it reduces measurement error and increases confidence in the interpretation of psychological assessment results, thereby supporting the instrument's application in both research and educational practice.

Although teachers routinely interact with students, colleagues, and school administrators, these frequent social encounters do not necessarily protect them from experiencing loneliness. Loneliness may arise when individuals perceive that their emotional needs, professional recognition, or meaningful interpersonal relationships remain unmet despite regular social contact. Previous studies have consistently demonstrated that loneliness among teachers is associated with increased levels of burnout, occupational stress, and reduced psychological well-being [60]. Furthermore, social support from colleagues and school organizations has been identified as an important protective factor that mitigates emotional exhaustion and promotes occupational well-being [61]. Recent meta-analytic evidence also highlights the quality of workplace relationships and organizational support as significant predictors of teachers' well-being [62]. In light of these findings, the six factors identified in the present study may reflect multiple dimensions of teachers' loneliness, including emotional loneliness, social loneliness, professional isolation, and perceived deficiencies in organizational support. Collectively, these findings reinforce the view that loneliness among teachers is a multifaceted psychological experience that should be understood within the broader context of the educational work environment and considered when developing interventions aimed at enhancing teachers' psychological well-being and professional quality of life.

The multidimensional nature of teachers' loneliness identified in the present study is further supported by recent evidence concerning changes in educational environments. [63] reported that the increasing integration of digital technologies into teaching and learning has fundamentally altered teachers' patterns of social interaction. Although digital communication has improved accessibility and collaboration, it has not fully replaced the quality of face-to-face interpersonal relationships. Consequently, many teachers continue to experience feelings of social isolation and reduced connectedness within their professional environments. These

findings are consistent with the results of the present study, suggesting that loneliness among teachers extends beyond the mere quantity of social contacts and is more closely related to the perceived quality and meaningfulness of interpersonal relationships in the workplace. This perspective reinforces the interpretation that loneliness in educational settings is a multidimensional psychological phenomenon influenced by both individual perceptions and organizational contexts.

Comparison with previous international validation studies further supports the construct validity of the adapted instrument. [31] demonstrated that the UCLA Loneliness Scale exhibits robust psychometric properties across different cultural settings, although the underlying factor structure frequently varies according to cultural background and population characteristics. Similarly, [59] found that multidimensional models of loneliness are more commonly supported than unidimensional models in recent psychometric investigations. The identification of six latent factors in the present study therefore provides additional evidence that loneliness is best understood as a multidimensional construct, particularly among teachers whose professional responsibilities involve complex emotional, interpersonal, and organizational demands. These findings also underscore the importance of validating psychological instruments within specific cultural and occupational contexts rather than assuming that factor structures established in other populations are universally applicable.

Overall, the psychometric evaluation demonstrated that the adapted loneliness instrument possesses satisfactory measurement properties. The adequacy of the measurement model was supported by an acceptable Kaiser–Meyer–Olkin (KMO) value, a statistically significant Bartlett's Test of Sphericity, satisfactory Measure of Sampling Adequacy (MSA) values for all items, and factor loadings that consistently exceeded the recommended minimum threshold. Collectively, these findings provide strong evidence of the instrument's construct validity and internal structural consistency. They are also consistent with the recommendations of [64] who emphasized that instruments characterized by well-defined factor structures and substantial factor loadings are more likely to produce accurate and reliable measurements of psychological constructs. Accordingly, the adapted loneliness scale can be considered a valid instrument for assessing loneliness among Indonesian teachers and may serve as a valuable tool for future research, psychological assessment, and evidence-based interventions aimed at strengthening teachers' psychological well-being, enhancing workplace social connectedness, and improving overall quality of professional life.

The principal novelty of this study lies in providing the first psychometric validation of the Indonesian version of the UCLA Loneliness Scale Version 3 specifically among teachers. While previous validation studies have primarily involved adolescents, university students, older adults, and general populations, the present study demonstrates that the instrument exhibits satisfactory construct validity and reliability within an Indonesian teacher population. Furthermore, the identification of a six-factor structure contributes new empirical evidence supporting the multidimensional nature of teacher loneliness in a non-Western educational context.

Collectively, these findings indicate that the validated instrument may facilitate more accurate identification of loneliness among teachers and provide a sound empirical basis for developing prevention programs, psychological support services, and organizational interventions within educational institutions. Consequently, the availability of a culturally validated instrument contributes not only to psychometric research but also to evidence-based educational policy and teacher well-being initiatives. The findings have several important implications for educational psychology research and professional practice. The validated instrument provides researchers with a culturally appropriate measure for investigating loneliness among teachers and facilitates cross-cultural comparisons in future studies. From a practical perspective, schools and educational policymakers may use the instrument as an early screening tool to identify teachers at risk of loneliness and to design evidence-based interventions that strengthen social connectedness, professional collaboration, and psychological well-being within educational institutions.

Despite these contributions, several limitations should be acknowledged. First, the study involved teachers from a single regency in Indonesia, which may limit the generalizability of the findings to teachers from other regions or educational systems. Second, the construct validity was examined only through Exploratory Factor Analysis (EFA); therefore, future studies should employ Confirmatory Factor Analysis (CFA) using larger and more heterogeneous samples to further verify the factor structure. Third, the cross-sectional design did not permit an evaluation of the temporal stability of the instrument through test–retest reliability.

Future research is recommended to validate the Indonesian version of the UCLA Loneliness Scale Version 3 across different educational levels, cultural settings, and occupational groups to enhance its external validity. Further psychometric investigations using Confirmatory Factor Analysis (CFA), Item Response Theory (IRT), or Rasch analysis are also recommended to provide stronger evidence of the instrument's measurement properties. In addition, longitudinal studies examining the relationship between teacher loneliness, burnout, work engagement, and psychological well-being would contribute to a more comprehensive understanding of loneliness in educational settings.

4. CONCLUSION

This study successfully evaluated the psychometric properties of the Indonesian version of the UCLA Loneliness Scale Version 3 among science teachers. The findings indicate that the adapted instrument demonstrates satisfactory construct validity and internal consistency reliability, confirming its suitability for assessing loneliness among Indonesian teachers. Furthermore, the identification of a six-factor structure suggests that teacher loneliness is a multidimensional construct influenced by emotional, social, and occupational experiences. As the first psychometric validation of this instrument among Indonesian teachers, this study contributes to the development of culturally appropriate psychological measurement tools for educational settings. The validated instrument provides important implications for educational psychology research and professional practice. It may serve as a reliable tool for assessing teacher loneliness, supporting early identification of teachers at risk of psychological distress, and informing the development of evidence-based interventions and policies to enhance teachers' psychological well-being, social connectedness, and overall quality of professional life. Future studies are encouraged to confirm the identified factor structure using Confirmatory Factor Analysis (CFA) with larger and more diverse samples to strengthen the generalizability of the findings.

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AUTHOR CONTRIBUTIONS

Conceptualization, Methodology, Data Analysis, Resources, Original Draft Preparation, Manuscript Editing, and Project Administration: All authors contributed substantially to these aspects of the study. Every author participated in reviewing and revising the manuscript throughout its development and provided final approval for the version submitted for publication.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all participants prior to their involvement in this study. Participants were informed about the purpose of the research, the voluntary nature of their participation, their right to withdraw from the study at any time without penalty, and the confidentiality and anonymity of their responses. For participants under the age of 18 years, written informed consent was obtained from their parents or legal guardians, and assent was obtained from the participants before data collection commenced. All images in this article have been authorized and are the property of the authors.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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