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RESEARCH ARTICLE

Mindfulness in Latin America: Psychometric Insights from the Mindful Attention Awareness Scale (MAAS-5) Across Four Countries

Daniel E. YUPANQUI-LORENZO [1] ✉, Ivan DIAZ-LEON [2], Luis PALAO-LOAYZA [3], Mario REYES-BOSSIO [4], Carlos CARBAJAL-LEÓN [5], Eduardo CÁRCAMO-ZEPEDA [6], Marlon Elías LOBOS RIVERA [7], Ma. De Lourdes CUELLAR-HERNÁNDEZ [8]

Affiliations
[1] Southern Scientific University, Peru
[2] School of Health Sciences, University of Sciences and Humanities, Peru
[3] Complutense University of Madrid, Spain
[4] Peruvian University of Applied Sciences, Peru
[5] FCCTP Research Institute, University of San Martín de Porres, Peru
[6] National Autonomous University of Honduras, Honduras
[7] Technological University of El Salvador, El Salvador
[8] Technological University of Altamira, Mexico

✉ Correspondence
Daniel E. YUPANQUI-LORENZO
Southern Scientific University
Panamericana Sur Km 19, Villa, Lima, 15067, Peru
Email: dyupanquil@cientifica.edu.pe

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Introduction: The high prevalence of mental health challenges in Latin America highlights the need for brief, culturally sensitive instruments capable of accurately assessing protective psychological resources, such as mindfulness.
Aim: Accordingly, the present study aimed to examine the psychometric properties of the abbreviated Mindful Attention Awareness Scale (MAAS-5) in four Spanish-speaking Latin American countries.
Methods: A total of 2,343 adults from Peru, El Salvador, Honduras, and Mexico participated in the study, recruited through non-probabilistic snowball sampling, and completed the MAAS-5 and the Patient Health Questionnaire-4 (PHQ-4).
Results: The instrument was evaluated for its internal structure, reliability, cross-cultural equivalence, and associations with external variables using descriptive analyses, confirmatory factor analysis (CFA), measurement invariance testing, psychometric network analysis, and latent correlations. CFA results supported a unidimensional structure across all countries. Measurement invariance analyses supported configural, metric, and scalar invariance across countries. Complementarily, network analysis confirmed a one-community structure, with node loadings exceeding .35 and high stability across 1,000 bootstrap samples. Within the network, items reflecting automaticity and inattention during action occupied relatively more central positions, whereas meta-oriented disengagement showed a more peripheral role. Finally, latent correlation analyses revealed strong negative associations between mindfulness and symptoms of anxiety and depression.
Conclusions: Overall, the findings provide evidence for the structural validity, stability, and cross-cultural equivalence of the MAAS-5, supporting its utility as a brief and reliable measure of mindfulness in clinical, educational, and population-based research contexts. The implications for cross-cultural assessment and the development of mindfulness-based interventions in Latin America are discussed.

Keywords: mindfulness, well-being, cross-cultural validation, network analysis, confirmatory factor analysis

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Introduction

Mental health problems represent a persistent public health challenge across Latin America, affecting the well-being of millions of individuals. Epidemiological evidence indicates high rates of anxiety, depression, and stress throughout the region, with prevalence estimates ranging from 29% to 36% depending on the population and country examined (Errazuriz et al., 2023; S. X. Zhang et al., 2022). These concerns have also been documented in Central American countries and Mexico, where common mental health problems remain highly prevalent (Kohn et al., 2018). Collectively, this evidence highlights the urgent need to identify psychological resources that may protect individuals from emotional distress. One construct that has received substantial empirical attention in this regard is mindfulness, as higher levels of dispositional mindfulness have been consistently associated with lower symptoms of anxiety, depression, and stress across diverse populations (Tomlinson et al., 2018).

In this context, mindfulness is defined as the capacity that enables individuals to sustain attention on present-moment experiences without engaging in evaluative judgments (Kabat-Zinn, 1994; Quaglia et al., 2015). This definition encompasses two fundamental components: intentional attention and a non-judgmental stance. The former pertains to the deliberate direction of awareness toward ongoing experiences, whereas the latter involves observing thoughts, emotions, and sensations without categorizing them as positive or negative (Alispahic et al., 2021). Furthermore, in the literature, mindfulness is frequently operationalized as a multifaceted construct comprising five components: observing internal and external experiences, describing these experiences using language, acting with awareness rather than on automatic pilot, non-judging of inner experience, and non-reactivity to internal events (Baer et al., 2006). Based on these elements, mindfulness is generally understood as a dispositional tendency to remain attentive to and aware of present-moment experiences in everyday life (Caycho-Rodríguez et al., 2021; Reyes-Bossio et al., 2022; Smith et al., 2017).

Within this context, mindfulness-based practices have gained increasing relevance because of their demonstrated role in fostering adaptive psychological processes, including emotional regulation, attentional awareness, and overall psychological well-being. Originally rooted in contemplative traditions, mindfulness has been integrated into contemporary psychological science as a set of practices that cultivate present-moment awareness and non-judgmental attention to internal experiences, which are considered fundamental to mental health and well-being (D. Zhang et al., 2021). Empirical evidence supports their effectiveness in reducing stress and anxiety and enhancing clarity when confronting emotionally challenging situations (La Torre et al., 2020; Wielgosz et al., 2019). Consequently, mindfulness has been incorporated into structured and evidence-based interventions, such as Mindfulness-Based Cognitive Therapy (MBCT) and Mindfulness-Based Stress Reduction (MBSR), both of which have shown robust benefits in the treatment of depressive and anxiety disorders, as well as conditions associated with chronic stress (Jaderek & Lew-Starowicz, 2019; Kriakous et al., 2021; Querstret et al., 2020; Rodrigues et al., 2024). Taken together, these findings support the relevance of mindfulness as a protective psychological factor in mental health and underscore the importance of its accurate assessment across diverse populations.

With the increasing application of mindfulness-based interventions, the precise evaluation of mindfulness experiences is crucial for comprehending individuals' psychological needs and developing contextually appropriate interventions. Among the available self-report instruments, the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) has become one of the most extensively utilized measures of dispositional mindfulness (Chems-Maarif et al., 2026). Its abbreviated five-item version (MAAS-5; Van Dam et al., 2010) is particularly notable for its efficiency and favorable psychometric properties (Caycho-Rodríguez, Ventura-León, et al., 2019). Although psychometric evidence from Latin America remains limited, findings from a Peruvian study indicated that MAAS-5 scores were positively related to life satisfaction and negatively related to depressive symptoms, providing initial support for the construct validity of the instrument in this cultural context (Caycho-Rodríguez et al., 2021). The brevity of the MAAS-5 facilitates its application across diverse populations—including adolescents, older adults, and clinical groups—as well as in large-scale surveys and health systems with limited resources, thereby enhancing its practical relevance for promoting psychological well-being in diverse contexts. However, as a brief instrument, the MAAS-5 has certain conceptual limitations. Specifically, it primarily operationalizes the attentional component of mindfulness and does not explicitly assess aspects related to acceptance or non-judgment. Nonetheless, some authors have posited that these elements may be implicitly integrated into sustained attention processes (Smith et al., 2017).

The meaningful application of psychological instruments across cultures requires rigorous validation to ensure that the measured construct is represented equivalently across populations. In the case of the MAAS-5, cross-cultural studies are essential to determine whether its factor structure and measurement properties remain stable

across societies with distinct sociocultural characteristics, thereby supporting valid comparisons (Deffner et al., 2022; Song et al., 2021). Initial evidence from Peru and Mexico has supported the unidimensional structure and strict measurement invariance of the MAAS-5 (Reyes-Bossio et al., 2022). However, research in Latin America remains limited, with most studies concentrated in countries such as Mexico, Peru, Colombia, Brazil, and Argentina, while Central American populations remain largely underrepresented. Expanding validation efforts to include these contexts is therefore necessary to strengthen the evidence base regarding the cross-cultural applicability of the instrument across the region.

Beyond expanding the geographical scope of validation, it is important to employ analytical approaches that provide complementary perspectives on the functioning of psychological measures. Although the MAAS-5 has been primarily examined using latent variable models, such as exploratory and confirmatory factor analyses (Caycho-Rodríguez, García Cadena, et al., 2019; Osman et al., 2016; Reyes-Bossio et al., 2022; Smith et al., 2017), no studies have evaluated the instrument using psychometric network analysis. Rather than representing competing frameworks, latent variable and network approaches offer complementary information regarding the internal structure of a measure. While confirmatory factor analysis (CFA) examines the extent to which items reflect an underlying construct, network analysis focuses on the pattern of direct associations among items and their relative contribution within the system (Borsboom & Cramer, 2013). Consequently, integrating both approaches may provide a more comprehensive evaluation of the MAAS-5, generating evidence regarding its structural validity, cross-cultural comparability, and item-level organization.

In light of these methodological considerations and the limited psychometric evidence available for the MAAS-5 in Latin America, the primary objective of the present study was to examine its psychometric properties using complementary contemporary analytical approaches across multiple countries, including psychometric network analysis and latent variable modeling. Specifically, this study aimed to (a) evaluate the internal structure of the instrument through both psychometric network analysis and CFA within each country; (b) estimate the stability and reliability of the measure using bootstrap procedures and reliability coefficients; (c) analyze item centrality indices to examine the relative importance of individual components within the network structure; (d) assess cross-country equivalence through network comparison tests and measurement invariance analyses; and (e) examine evidence of validity based on relations with other variables by analyzing the associations between mindfulness and symptoms of anxiety and depression, given the well-established inverse relationship between these constructs in the literature (Carpenter et al., 2019; Ćavar et al., 2025; Reangsing et al., 2023).

Methods

Participants

The sample size was determined using a Monte Carlo simulation analysis for network estimation (Constantin et al., 2023). The simulation specified a network of five nodes corresponding to the number of items in the instrument, a preset density of .40, and a statistical power of .95, as recommended for the network analysis. The results indicated that a minimum sample size of 216 was required for each country. Data were collected using a non-probabilistic snowball sampling strategy, an approach commonly used in multicenter studies to obtain large and heterogeneous samples when participant recruitment relies on existing social, academic, or institutional networks. In the present study, the inclusion of the four participating countries was determined by logistical feasibility and the interest of local research teams with access to institutional resources required for data collection, rather than by a predefined probabilistic sampling design.

Participants were eligible for inclusion if they met the following criteria: (a) being of legal age according to the legislation of their respective country of residence, (b) residing in one of the participating countries, and (c) providing informed consent to participate in the study. The final sample comprised 2,343 individuals from four Latin American countries (Table 1): Peru (N = 947), El Salvador (N = 559), Honduras (N = 527), and Mexico (N = 310). The mean age varied across countries, with higher average ages observed in El Salvador (M = 27.73, SD = 8.76) and lower values in Mexico (M = 20.56, SD = 4.18). Across all countries, female participants predominated, with proportions ranging from 60.3% in El Salvador to 74.2% in Mexico. Most participants reported being single, particularly in Mexico (95.2%) and Peru (84.5%).

Regarding educational attainment, a substantial proportion of participants had completed or were currently enrolled in university-level education in all four countries. Notably, Mexico had a comparatively higher propor-

tion of individuals with technical education (28.4%). Conversely, only a small fraction of participants reported educational levels corresponding to basic education (Elementary and High School). Low to moderate physical activity levels were the most frequently reported across countries, whereas intense physical activity was less common, with the highest prevalence observed in Mexico (11.0%) and Honduras (9.5%). Overall, the sociodemographic characteristics of the sample reflected a diverse cohort with sufficient variability to support comparative psychometric analyses across countries.

Table 1. Sociodemographic characteristics

Variable	Peru	El Salvador	Honduras	Mexico
	N = 947	*N* = 559	*N* = 527	*N* = 310
Age	24.98 (9.62)	27.73 (8.76)	25.52 (7.72)	20.56 (4.18)
Sex				
Male	341 (36.0%)	222 (39.7%)	139 (26.4%)	80 (25.8%)
Female	606 (64.0%)	337 (60.3%)	388 (73.6%)	230 (74.2%)
Civil Status				
Single	800 (84.5%)	416 (74.4%)	438 (83.1%)	295 (95.2%)
Married	82 (8.7%)	87 (15.6%)	51 (9.7%)	14 (4.5%)
Cohabitant	52 (5.5%)	45 (8.1%)	21 (4.0%)	0 (0.0%)
Divorced	9 (1.0%)	9 (1.6%)	2 (0.4%)	1 (0.3%)
Widowed	4 (0.4%)	2 (0.4%)	15 (2.8%)	0 (0.0%)
Education				
Incomplete Elementary School	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)
Complete Elementary School	0 (0.0%)	2 (0.4%)	6 (1.1%)	0 (0.0%)
Incomplete High School	2 (0.2%)	2 (0.4%)	41 (7.8%)	0 (0.0%)
Complete High School	157 (16.6%)	31 (5.5%)	85 (16.1%)	0 (0.0%)
Incomplete Technical Education	10 (1.1%)	15 (2.7%)	0 (0.0%)	40 (12.9%)
Complete Technical Education	44 (4.6%)	25 (4.5%)	19 (3.6%)	88 (28.4%)
Incomplete University Education	540 (57.0%)	395 (70.7%)	317 (60.2%)	155 (50.0%)
Complete University Education	194 (20.5%)	88 (15.7%)	59 (11.2%)	27 (8.7%)
Physical Activity				
None	184 (19.4%)	96 (17.2%)	111 (21.1%)	66 (21.3%)
Low	410 (43.3%)	218 (39.0%)	203 (38.5%)	114 (36.8%)
Moderate	297 (31.4%)	193 (34.5%)	163 (30.9%)	96 (31.0%)
Intense	56 (5.9%)	52 (9.3%)	50 (9.5%)	34 (11.0%)

Note. Mean (*SD*); *n* (%).

Measures

Mindful Attention Awareness Scale (MAAS-5)

MAAS-5 (Van Dam et al., 2010) consists of five highly informative items selected from the original 15-item Mindful Attention Awareness Scale developed by Brown and Ryan (2003) to assess dispositional mindfulness. The scale evaluates an individual's tendency to attend to and be aware of present-moment experiences in daily life. Items are rated on a six-point Likert-type scale ranging from 1 (almost always) to 6 (almost never), with higher scores indicating greater mindful attention and awareness and lower scores reflecting a predominance of automatic functioning and difficulties in sustaining attention during everyday activities. All five items are phrased in terms of experiences reflecting lapses in attention and awareness during everyday activities. Consequently, the assessment of mindfulness is based on the inverse of these experiences, with item responses reverse-scored so that higher scores indicate greater levels of mindful attention and awareness.

In the present study, we used the Spanish version of the MAAS-5 adapted and validated by Caycho-Rodríguez et al. (2019). This version demonstrated a unidimensional factor structure with excellent model fit (CFI = .99; RMSEA = .05, 90% CI [.00, .09]) and satisfactory internal consistency, as evidenced by a McDonald's omega

of .83 (95% CI [.79, .85]). In addition, strict measurement invariance across groups was supported, indicating stable measurement properties across subpopulations. Complementary evidence from studies conducted with older adult samples yielded comparable psychometric results (Caycho-Rodríguez et al., 2021), further supporting the applicability of the MAAS-5 across diverse age groups and reinforcing its suitability for cross-cultural and psychological assessment studies.

Patient Health Questionnaire-4 (PHQ-4)

PHQ-4 (Kroenke et al., 2009) is a brief screening instrument designed to assess the frequency of anxiety and depressive symptoms over the past two weeks. It consists of four items, with two items evaluating depressive symptoms and two assessing anxiety symptoms. Responses are rated on a four-point Likert-type scale ranging from 0 ("not at all") to 3 ("nearly every day"). The total score ranges from 0 to 12, with higher scores indicating greater symptom frequency and overall psychological distress.

In the present study, we used the Spanish version of the PHQ-4, adapted by Kocalevent et al. (2014) and validated in Peru by Carbajal-León et al. (2024). This version demonstrated both unidimensional and two-factor structures with satisfactory fit. For the purposes of this study, the two-factor model was used, showing excellent fit indices (CFI = 1.00, TLI = 1.00, SRMR = .04, RMSEA = .00) and strict measurement invariance. Reliability estimates based on McDonald's omega were .83 for anxiety and .78 for depression (Carbajal-León et al., 2024).

Procedures

The study followed a structured protocol and was conducted in accordance with the established ethical standards. The research protocol was approved by the Research Ethics Committee of the University of Sciences and Humanities (Acta CEI No. 069; Cod. 033-2025). Following ethical clearance, collaboration was established with educators and researchers affiliated with academic institutions in Peru, El Salvador, Honduras, and Mexico to facilitate participant recruitment and ensure adherence to the study's standardized procedures.

Data were collected using an online survey developed specifically for this study, which included an informed consent form, detailed participation instructions, and assessment instruments. Data collection took place in March 2025 through a digital dissemination strategy that combined institutional academic networks and social media platforms. This approach was intended to enhance sample heterogeneity and promote participation by individuals with diverse sociodemographic backgrounds. Additionally, the online survey was configured to require responses to all items, thereby preventing any missing data. Furthermore, to control potentially inconsistent or inattentive responses, a set of control items was included to assess participants' attention, ensuring the quality and accuracy of the data.

Throughout the data collection period, ongoing communication was maintained with local collaborators to monitor recruitment progress, address contingencies, and ensure the consistent implementation of the protocol across countries. At all stages of the study, the principles of voluntary participation, anonymity, and confidentiality were strictly upheld in accordance with international ethical guidelines. Following data collection, the responses were screened, processed, and prepared for statistical analysis in line with the study objectives.

Data Analysis

All statistical analyses were conducted using R (version 4.4.2) via RStudio (version 2026.01.1) and organized into sequential analytical phases. Descriptive statistics were computed for each item, including measures of central tendency, dispersion, and distributional shape. Univariate normality was evaluated using skewness (g_1) and kurtosis (g_2) coefficients, with $g_1 \leq 3$ and $g_2 \leq 7$ considered acceptable (Finney & DiStefano, 2013). Inter-item correlations were examined to assess the overall pattern of associations within the scale.

Confirmatory Factor Analysis. CFA was conducted to examine the unidimensional structure of the MAAS-5 in the participating countries. Considering the ordinal nature of the data and the presence of floor effects, the WLSMV estimator was employed. Model fit was evaluated using multiple indices, including χ^2, Comparative Fit Index (CFI > .90), Tucker-Lewis Index (TLI > .90), Root Mean Square Error of Approximation (RMSEA < .08), and Standardized Root Mean Square Residual (SRMR < .08), in accordance with the established recommendations (Browne & Cudeck, 1992; Hu & Bentler, 1999). Factor loadings were also inspected, with values exceeding .50

considered indicative of an adequate representation of the latent construct (Dominguez-Lara, 2018). Reliability was assessed using Cronbach's alpha coefficient and McDonald's omega coefficient (Viladrich et al., 2017).

Measurement invariance was assessed based on the instrument's unidimensional structure across countries. A hierarchical approach was followed to test configural, metric, and scalar invariance. Model comparisons were conducted using ΔCFI < .01 (Cheung & Rensvold, 2002), and the RMSEA Difference ($RMSEA_D$ < .05; Beribisky & Hancock, 2024) was used as a complementary index to evaluate changes in the approximate model fit. Compared to ΔRMSEA, $RMSEA_D$ has been shown to be more sensitive to lack of invariance, less affected by the dilution effect associated with increasing degrees of freedom, and suitable for use with ordinal data (Abulela et al., 2025). These criteria were used to determine whether the constraints imposed at each level resulted in a meaningful deterioration of the model fit.

Exploratory Graph Analysis. A global psychometric network model was estimated using each sample. The network was estimated using the *ggmModSelect* approach, which is based on unregularized partial correlations and aims to reduce spurious associations while capturing conditional dependencies among the items (Epskamp et al., 2018). Given the ordinal nature of the MAAS-5 items, a Spearman correlation matrix was used (Isvoranu & Epskamp, 2023). Network loadings were computed for each node and interpreted as small (≥.15), moderate (≥.25), or large (≥.35), following the criteria proposed by Christensen and Golino (2021b). In addition, strength centrality was examined to identify the relative importance of each item within the network, which reflects the overall magnitude of its connections to other nodes.

The stability and accuracy of the estimated network were evaluated using non-parametric bootstrapping procedures with 1,000 re-samples. This process allowed for the assessment of the replicability of edge weights and centrality estimates with 95% confidence intervals. The stability of the centrality indices was quantified using the correlation stability coefficient (CS), with values of .25 or higher considered acceptable indicators of robustness (Epskamp et al., 2018).

In addition, country-specific networks were estimated to examine the structural and metric invariance across the participating countries. Cross-group equivalence was evaluated using the Network Comparison Test (NCT), which focuses on differences in global network structure and edge strength, thereby capturing the stability of the association pattern among items. Network comparisons were conducted using the NCT with 1,000 permutations, with statistical significance set at $p < .05$ (van Borkulo et al., 2023). For metric invariance, item-level network loadings were compared across the countries. Significant differences were identified at $p < .05$ and further evaluated using the Benjamini–Hochberg correction for multiple comparisons, with the adjusted significance set at $p_{BH} < .10$ (Benjamini & Hochberg, 1995). This approach facilitated the examination of whether the observed differences were attributable to genuine structural variations within the networks, as opposed to being influenced by the sample-specific characteristics.

Correlation Analysis Between Latent Variables. Structural models were estimated to examine the associations between the latent variables and symptoms of anxiety and depression. Based on previous theoretical and empirical evidence, moderate to strong associations were expected. Model fit was evaluated using the same criteria applied in the CFA.

Results

Item Analysis

The descriptive statistics for the five MAAS-5 items are presented in Table 2. The item means ranged from 2.37 to 3.14, with standard deviations between 1.26 to 1.52. Item distributions were approximately symmetric (skewness g_1 = .24–.86) and showed kurtosis values close to normality (g_2 = –.77–.04), supporting the suitability of the data for subsequent correlation and network analyses. Inter-item associations within each country were moderate to high (Spearman's ρ = .49–.77). The strongest correlations were consistently observed between maas4 and maas5, whereas maas3 exhibited the weakest associations with the remaining items.

Table 2. Items Analysis of the MAAS-5

Country	Items	*M*	*SD*	g_1	g_2	Correlation					Network Loadings	Factor Loadings
						1	2	3	4	5		
Peru	1. maas1	2.80	1.35	.51	−.33	—					.46	.77
	2. maas2	2.70	1.26	.45	−.37	.63	—				.52	.80
	3. maas3	2.99	1.38	.38	−.63	.49	.55	—			.38	.71
	4. maas4	2.56	1.35	.64	−.32	.59	.62	.59	—		.62	.87
	5. maas5	2.61	1.33	.61	−.29	.59	.58	.50	.72	—	.51	.82
El Salvador	1. maas1	2.72	1.52	.61	−.72	—					.49	.81
	2. maas2	2.65	1.38	.72	−.25	.63	—				.50	.81
	3. maas3	2.81	1.42	.54	−.54	.52	.53	—			.36	.70
	4. maas4	2.45	1.39	.78	−.25	.66	.66	.58	—		.64	.91
	5. maas5	2.49	1.39	.74	−.30	.61	.62	.52	.72	—	.51	.84
Honduras	1. maas1	2.46	1.38	.86	.04	—					.43	.81
	2. maas2	2.51	1.31	.73	−.10	.56	—				.44	.78
	3. maas3	2.70	1.49	.56	−.77	.50	.55	—			.42	.79
	4. maas4	2.37	1.32	.78	−.20	.66	.55	.66	—		.58	.85
	5. maas5	2.44	1.44	.85	−.17	.65	.69	.62	.70	—	.65	.89
Mexico	1. maas1	2.86	1.32	.38	−.55	—					.52	.82
	2. maas2	2.77	1.30	.54	−.39	.68	—				.48	.82
	3. maas3	3.14	1.38	.24	−.66	.61	.54	—			.38	.72
	4. maas4	2.75	1.30	.42	−.52	.66	.67	.63	—		.66	.92
	5. maas5	2.85	1.41	.43	−.68	.61	.64	.53	.77	—	.49	.84

Note. *M* = means, *SD* = standard deviation; g_1 = skewness; g_2 = kurtosis. Peru (*N* = 947); El Salvador (*N* = 559); Honduras (*N* = 527); Mexico (*N* = 310).

Confirmatory Factor Analysis

Regarding confirmatory factor analysis (CFA), the model demonstrated adequate fit in the overall sample, as evidenced by the CFI (.99), TLI (.99), and SRMR (.02). Although the RMSEA was higher than recommended (.11, 90% CI [.09, .13]), this result may be attributable to the model's low degrees of freedom (Table 3). At the country level, all models showed a generally acceptable fit, with El Salvador exhibiting the best fit among the four countries (CFI = 1.00, TLI = 1.00, SRMR = .01, RMSEA = .07). Although most fit indices were within the recommended thresholds across countries, RMSEA values showed variability and were above expected levels in some cases ($RMSEA_{Peru}$ = .16; $RMSEA_{Honduras}$ = .13; $RMSEA_{Mexico}$ = .17). The examination of the modification indices suggested potential correlations between error terms; however, these modifications were not implemented, as they lacked theoretical justification and would have only improved the model fit in a data-driven manner. Additionally, factor loadings exceeded .70 across all countries, indicating that each item strongly represented the underlying construct.

In terms of reliability, the MAAS-5 demonstrated high internal consistency across all countries, with Cronbach's alpha values exceeding .89 and McDonald's omega coefficients exceeding .88.

Table 3. Metric Invariance Based on Latent Model

	χ^2	*df*	CFI	TLI	SRMR	RMSEA	LI	UI	α	ω	ΔCFI	$RMSEA_D$
Confirmatory models												
Overall	45.4	5	.99	.99	.02	.11	.09	.13	.90	.89	–	–
Peru	46.0	5	.98	.97	.03	.16	.14	.19	.89	.88	–	–
El Salvador	4.2	5	1.00	1.00	.01	.07	.04	.08	.91	.89	–	–
Honduras	25.0	5	.99	.98	.03	.13	.10	.17	.91	.90	–	–
Mexico	17.3	5	.99	.98	.03	.17	.13	.21	.91	.91	–	–
Invariance by Country												
Configural	92.5	20	.99	.98	.03	.14	.13	.16	–	–	–	–
Metric	131.0	32	.99	.99	.03	.10	.09	.11	–	–	.00	.03
Scalar	177.8	89	.99	1.00	.03	.07	.06	.07	–	–	.00	.01

Note. χ^2 = chi-squared; *df* = degree of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; LI = lower limit of the 90% confidence interval; UI = upper limit of the 90% confidence interval; α = Cronbach's alpha coefficient; ω = McDonald's omega coefficient; Δ = difference; $RMSEA_D$ = Root Mean Square Error of Approximation based on Difference test.

Multigroup Confirmatory Factor Analysis

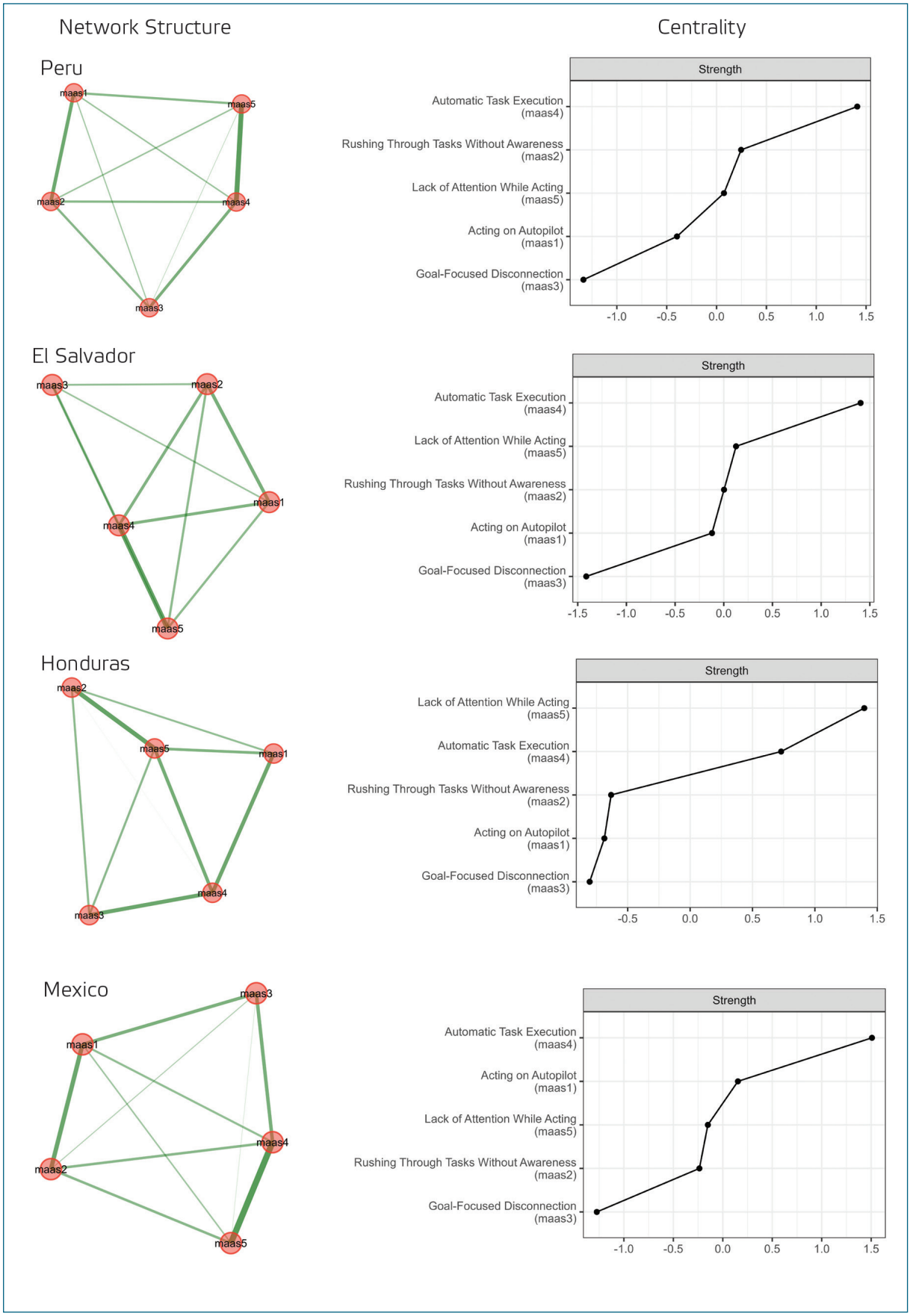
A complementary measurement invariance analysis was conducted to examine the cross-country equivalence. Model comparisons based on changes in CFI showed no variation across the nested models (ΔCFI = .00), supporting the assumption of invariance at each level. Complementarily, $RMSEA_D$ values were below .05 across all comparisons (metric = .03; scalar = .01).

Exploratory Graph Analysis

Network estimation revealed a coherent and parsimonious structure in all four countries. In each case, the five nodes clustered into a single community, with all network loadings exceeding .35, which corresponds to large effect sizes according to the established criteria (see Table 2). The estimated networks demonstrated high structural stability, with a one-community solution replicated in 100% of the 1,000 bootstrap samples.

The analysis of node centrality yielded a consistent and interpretable pattern across countries. Automatic Task Execution (maas4) emerged as the most central node in Peru, El Salvador, and Mexico, with strength values approximately 1.4 standard deviations above the network mean. In Honduras, the highest centrality was observed for Lack of Attention While Acting (maas5), although its relative prominence was comparable to that of maas4 in the other samples. In contrast, Goal-Focused Disconnection (maas3) consistently exhibited the lowest centrality (approximately –1 standard deviation), followed by comparatively low values for maas1 and maas2 (Figure 1).

Figure 1. Network Structure and Strength Centrality by Country



Network Comparison and Cross-Country Equivalence

Network invariance analyses based on item-level network loadings indicated substantial metric stability of the MAAS-5 across the four countries in this study. After applying the Benjamini–Hochberg correction for multiple comparisons, only two items showed statistically significant differences. For Rushing Through Tasks Without Awareness (maas2), Peru (Δ = .082, p = .021, p_{BH} = .053) exhibited slightly higher loadings than Honduras. In contrast, for Lack of Attention While Acting (maas5), Peru (Δ = –.142, p = .001, p_{BH} = .005) and El Salvador (Δ = –.135, p = .004, p_{BH} = .020) demonstrated significantly lower loadings than Honduras. Honduras (Δ = .157, p = .003, p_{BH} = .015) exhibited higher loadings than Mexico. No other item-level comparisons were statistically significant.

Table 4. Detection of Non-Invariant Items Across Countries

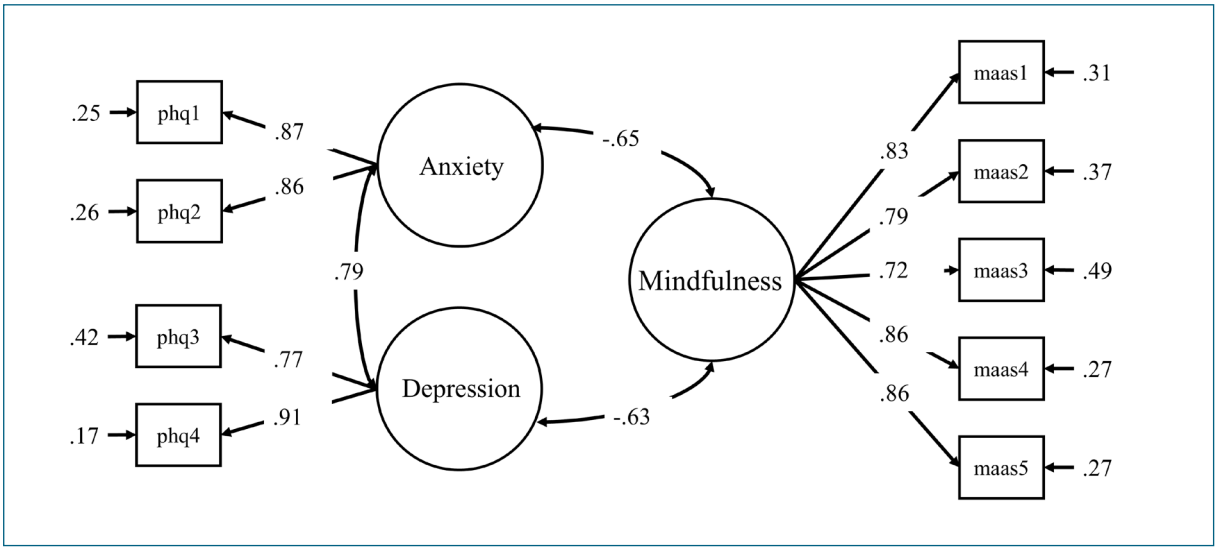
Items	Item Description	Countries	Dif.	p	p_{BH}	Direction
maas2	I rush through activities without being really attentive to them.	Peru vs Honduras	.082	.021	.053	PE > HO
maas5	I find myself doing things without paying attention.	Peru vs Honduras	−.142	.001	.005	PE < HO
		El Salvador vs Honduras	−.135	.004	.020	ES < HO
		Honduras vs Mexico	.157	.003	.015	HO > ME

Note. PE = Peru, HO = Honduras, ES = El Salvador; ME = Mexico.

Correlation Analysis Between Latent Variables

Finally, associations with external variables were examined through latent correlations between mindfulness and symptoms of anxiety and depression (Figure 2). The model demonstrated an adequate fit (CFI = .98, TLI = .98, SRMR = .04, RMSEA = .08). Mindfulness showed strong negative latent correlations with anxiety (r=–.65) and depression (r=–.63), indicating that higher levels of mindfulness were associated with lower levels of both symptoms. These findings are consistent with the prior literature and support the construct validity of the MAAS-5 through its expected relationships with relevant psychological variables.

Figure 2. Latent Correlation Between Mindfulness, Anxiety, and Depression



Discussion

This study represents the first comprehensive psychometric evaluation of the MAAS-5 in samples from four Spanish-speaking Latin American countries, thereby extending prior empirical evidence that had been limited to Peru and Mexico (Reyes-Bossio et al., 2022). Overall, the findings provide evidence for the reliability and validity of this instrument in the region. Specifically, the MAAS-5 exhibited a unidimensional structure, satisfactory in-

ternal consistency, and an invariant configuration across countries. Collectively, these results support the MAAS-5 as a brief, reliable, and cross-culturally comparable measure of dispositional mindfulness that is suitable for use in diverse Latin American contexts.

At the descriptive and correlational levels, the instrument demonstrated consistent internal functioning across all four countries, as reflected in moderate to high inter-item associations and highly similar correlational patterns. This homogeneity suggests that the five items capture the core and recurrent aspects of dispositional mindfulness that transcend cultural, educational, and contextual differences in the sample. These findings are consistent with previous research conducted on Latin American samples (Caycho-Rodríguez, García Cadena, et al., 2019; Reyes-Bossio et al., 2022) and align with the theoretical conceptualizations of mindfulness as a relatively stable disposition manifested through everyday behaviors related to noticing, attending to, and sustaining awareness during ongoing activities (Brown & Ryan, 2003). Moreover, the uniformity observed in inter-item relationships suggests that the core components of mindfulness are represented by a coherent pattern of associations among indicators of behavioral automaticity and attentional disengagement, reinforcing the conceptual consistency of the construct across the countries examined. Taken together, these results underscore the suitability of the MAAS-5 for cross-cultural research on heterogeneous populations.

Confirmatory factor analysis (CFA) and exploratory graph analyses (EGA) provided complementary evidence supporting the predominantly unidimensional structure of the MAAS-5. The CFA results supported a unidimensional model in the overall sample, and the same factorial solution was replicated across each country, aligning with previous findings reported in the literature (Caycho-Rodríguez, García Cadena, et al., 2019; Reyes-Bossio et al., 2022; Smith et al., 2017). Complementing these findings, the estimated networks exhibited high stability across bootstrap replications and showed a coherent configuration characterized by a single community with generally strong inter-item connections. Taken together, the consistency of the factorial structure across countries and the stability and unidimensional organization observed in the network analyses provide convergent evidence supporting a unidimensional representation of mindfulness as assessed by the MAAS-5.

Although the RMSEA values exceeded the recommended thresholds in almost all cases, this pattern should be interpreted with caution. Elevated RMSEA estimates in models with few degrees of freedom have been well documented and may reflect statistical artifacts rather than substantive model misfit (Kenny et al., 2015; Shi et al., 2022). Furthermore, the sensitivity of RMSEA to sample size and its dependence on the χ^2 statistic may inflate its values, particularly in large samples and parsimonious models (Browne & Cudeck, 1992; Kenny et al., 2015; MacCallum et al., 1996). This interpretation is further supported by the measurement invariance analyses, where RMSEA values progressively decreased as additional equality constraints were imposed and the degrees of freedom increased. Such a pattern suggests that the elevated RMSEA estimates observed in the independent models were more likely attributable to the low degrees of freedom than to substantive problems with model fit.

Measurement invariance analyses supported the equivalence of the MAAS-5 across countries, achieving scalar invariance. This finding indicates that factor loadings and thresholds were comparable across groups, allowing for meaningful cross-country comparisons and reinforcing the robustness of the instrument despite cultural differences. These results extend the evidence reported between Peru and Mexico (Reyes-Bossio et al., 2022) to a broader set of Latin American countries, including Central America. Complementarily, from a psychometric network perspective, cross-country equivalence is reflected in the stability of the pattern of associations among items (Christensen & Golino, 2021a). The results indicate a largely stable metric structure of the MAAS-5 across the four countries examined. At the item level, only two indicators showed statistically significant differences in the network loadings. Specifically, maas2 (Rushing Through Tasks Without Awareness) exhibited slightly higher loadings in Peru than in Honduras, whereas maas5 (Lack of Attention While Acting) showed higher loadings in Honduras than in Peru, El Salvador, and Mexico. Importantly, these differences were small in magnitude and did not compromise the overall dimensionality or cross-cultural comparability of the scale, with both instances of non-invariance primarily involving the Honduran sample. In this regard, the slight item-level differences detected in the network analyses do not necessarily contradict the scalar invariance observed in the multigroup CFA. Whereas measurement invariance evaluates the equivalence of latent measurement parameters across groups, psychometric network models focus on the pattern and strength of direct associations among observed indicators. Consequently, minor variations in specific item associations may emerge even when the broader latent structure remains invariant across groups. Thus, the differences observed for maas2 and maas5 are better interpreted as localized fluctuations in network relationships rather than as substantive threats to the overall cross-cultural equivalence of the MAAS-5.

These item-specific variations may reflect culturally embedded differences in the perception and reporting of mindfulness-related experiences, particularly those associated with attentional lapses and automatic behaviors. Prior research suggests that sociocultural norms, introspective practices, and emotion socialization processes can influence responses to self-report measures of mindfulness (Christopher et al., 2009; Ghorbani et al., 2009; Olivera-Figueroa et al., 2023). In the Latin American context, disparities in the dissemination and institutionalization of mindfulness-based programs have also been documented, with greater availability typically observed in urban areas and in countries where psychoeducational interventions are more firmly established (Reyes-Bossio et al., 2022). These structural differences may influence individuals' familiarity with the introspective language required by instruments such as the MAAS-5, thereby shaping their self-assessment of automatic behavior and attentional lapses. Furthermore, cross-cultural research suggests that more collectivist cultural orientations may place less emphasis on explicit self-observation of internal experiences than contexts that actively promote individual introspection (Christopher et al., 2009). From this perspective, the observed discrepancies are better understood as context-sensitive variations in the expression of the construct rather than as indicators of psychometric weakness. At the same time, these differences may be partially attributable to sociodemographic heterogeneity across the samples. Variations in age, sex, and educational level, particularly within the Honduran subsample, may have contributed to differences in item associations, given the sensitivity of network models to sample composition. Accordingly, these findings should be interpreted with caution, acknowledging the potential interplay between cultural, structural, and sociodemographic factors. Importantly, these influences do not undermine the overall validity or applicability of the scale but rather highlight the contextual nuances through which mindfulness-related experiences may be expressed across countries.

Beyond the evidence for cross-country equivalence, the network analyses also provided insights into the relative importance of individual mindfulness indicators within the system. Across countries, the most central nodes consistently corresponded to automatic execution and inattention during action (maas4 and maas5), a pattern that converges with the CFA findings, in which these items displayed factor loadings above .80. This pattern aligns with the prevailing definitions of mindfulness, which involve the regulation of habitual and automatic modes of functioning and the maintenance of present-moment awareness (Wielgosz et al., 2019). From a network perspective, the prominence of these nodes may suggest that difficulties related to automaticity constitute a significant component of dispositional mindfulness (Borsboom, 2017). However, it is crucial to acknowledge that centrality indices are sample dependent and should not be interpreted as definitive indicators of causal importance. From an applied perspective, the centrality of these items tentatively suggests that automatic behavioral patterns may occupy a prominent position within the mindfulness network, potentially relating to other interconnected components. Conversely, the relatively lower centrality of the item reflecting goal-oriented disengagement (maas3) may indicate that this aspect is more context-dependent or less salient in the network structure. Nonetheless, these interpretations should be considered provisional and warrant further replication using diverse samples and methodological approaches.

In addition to the evidence supporting the internal structure and cross-cultural functioning of the MAAS-5, further validity evidence was obtained through its associations with external psychological variables. As a final set of analyses, correlation analysis between latent variables was conducted to examine the relationships between mindfulness and external psychological variables, providing additional validity evidence based on the associations with other constructs. The results indicated strong negative associations between mindfulness and anxiety and depression, suggesting that higher levels of dispositional mindfulness are linked to lower levels of emotional symptomatology. This pattern is theoretically consistent with the conceptualization of mindfulness as a dispositional tendency to remain attentive to and aware of present-moment experiences in everyday life, which has been associated with lower levels of psychological distress (Smith et al., 2017). Recent empirical evidence has similarly reported inverse associations between mindfulness and anxiety and depression symptoms across diverse populations (Carpenter et al., 2019; Ćavar et al., 2025; Dörner et al., 2024; Sharma & Kumra, 2022). Taken together, these findings provide further support for the construct validity of the MAAS-5, demonstrating that its scores relate to external variables in the theoretically expected directions.

Strengths and Limitations

This study has several strengths that enhance its contribution to the psychometric literature on mindfulness assessment in Latin America. First, it builds upon prior cross-national research on the abbreviated Mindful Attention Awareness Scale (MAAS-5; Reyes-Bossio et al., 2022), extending the evidence beyond Peru and Mexico to a broader set of Spanish-speaking Latin American countries. Second, the large multicenter sample allowed for

a robust estimation of psychometric properties and supported the examination of cross-country measurement invariance. Third, the inclusion of both psychometric network analysis and confirmatory factor analysis provided convergent evidence supporting the unidimensional structure of the MAAS-5 and enabled triangulation of findings across distinct methodological frameworks. Fourth, the joint examination of network invariance and measurement invariance constitutes a methodological strength, as it allows for the identification of central and peripheral items while simultaneously evaluating the equivalence of item functioning across countries. This integrated approach offers a more nuanced understanding of the internal structure of mindfulness and strengthens the interpretation of the scale's dimensionality and stability.

Despite these strengths, several limitations should be acknowledged in this study. The use of a non-probabilistic snowball sampling strategy restricts the generalizability of the findings, as the sample may over-represent individuals with higher educational attainment and access to academic or digital networks. More specifically, participants were recruited through online platforms, which may have led to the over-representation of digitally connected individuals with relatively high educational levels. Additionally, the predominance of female participants across all countries may limit the applicability of the results to more gender-balanced populations in the future. The cross-sectional design precludes conclusions regarding temporal stability or sensitivity to change, which are particularly relevant to mindfulness-based interventions. Moreover, given the cross-sectional nature of the data, the associations observed within the network should not be interpreted as causal relationships among items, and any implications regarding potential intervention targets should be considered as exploratory. Furthermore, although minor cross-country discrepancies were observed at the item level, this study did not directly examine the potential cultural or contextual factors underlying these variations, which warrants further qualitative and quantitative exploration. Although the study examined associations with anxiety and depression, it did not evaluate other external variables, such as well-being, stress, age, gender, or intervention-related outcomes. Additionally, while both confirmatory factor analysis (CFA) and psychometric network analysis were employed, these approaches were not formally integrated or compared within a unified analytical framework. Finally, a further limitation concerns the interpretation of the RMSEA values in the confirmatory factor analyses. In several country-specific models, the RMSEA exceeded the recommended thresholds; however, this should be interpreted with caution.

Conclusion, Implications, and Future Directions

In conclusion, the present study provides evidence supporting the MAAS-5 as a brief and structurally coherent measure of mindfulness across four Spanish-speaking Latin American countries. The findings support a predominantly single-community structure, high network stability across bootstrap replications, and substantial metric invariance, suggesting that the instrument captures a comparable construct across cultural contexts despite minor variations. The centrality of items related to automatic behavior and attentional lapses aligns with theoretical perspectives that conceptualize mindfulness as present-moment awareness in everyday functioning, whereas the peripheral role of meta-oriented disengagement may reflect contextual or experiential differences in its expression.

Importantly, these findings were primarily derived from a psychometric network framework and provided evidence regarding the internal structure of the instrument. This pattern was mirrored in the CFA results, which supported a unidimensional latent structure across countries, reinforcing the structural coherence of the MAAS-5 scale. Additionally, associations with external variables were examined, showing that mindfulness was negatively related to anxiety and depression, thereby providing further support for construct validity based on the relationships with other variables. Nevertheless, conclusions should be interpreted within the scope of the evidence presented, as other aspects of validity, such as those related to the consequences of assessment, were not directly evaluated.

From an applied perspective, these results support the use of the MAAS-5 in clinical, educational, and population-based settings where brief and psychometrically sound instruments are required for measuring mindfulness. The demonstrated cross-cultural equivalence enhances its utility for comparative research and evaluation of mindfulness-based interventions across Latin American contexts. Methodologically, the integration of psychometric networks and factor analyses represents a valuable framework for future scale validation studies, particularly in cross-cultural research.

Future research should prioritize longitudinal designs to assess temporal stability and responsiveness to intervention-related changes. Additionally, expanding validation efforts to probabilistic samples, other Latin American countries, and non-Spanish-speaking contexts would further strengthen the generalizability of these findings.

Although the present study provided evidence of validity based on relationships with anxiety and depression, future research should extend this line of inquiry by examining associations with a broader range of theoretically relevant constructs, including well-being, stress, emotion regulation, intervention-related outcomes, and sociodemographic variables. Such efforts would contribute to a more comprehensive understanding of the functional role of mindfulness and strengthen the applicability of the MAAS-5 in diverse research and applied settings.

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Author contribution
Daniel E. YUPANQUI-LORENZO: conceptualization, design, methodology, investigation, project administration, data management, formal analysis, supervision, writing original draft, writing review and editing.
Ivan DIAZ-LEON: conceptualization, investigation, formal analysis, writing original draft, writing review and editing.
Luis PALAO-LOAYZA: conceptualization, design, methodology, investigation, interpretation, writing original draft.
Mario REYES-BOSSIO: methodology, investigation, formal analysis, interpretation, writing original draft, writing review and editing.
Carlos CARBAJAL-LEÓN: methodology, investigation, formal analysis, interpretation, writing original draft.
Eduardo CÁRCAMO-ZEPEDA: investigation, data management, writing original draft.
Marlon Elías LOBOS RIVERA: investigation, data management, writing original draft.
Ma. De Lourdes CUELLAR-HERNÁNDEZ: investigation, data management, writing original draft.

Declaration of interest statement
The authors declare that there are no financial, personal, or institutional conflicts of interest that could have influenced the conduct or reporting of this research.

Ethical statement
This manuscript is the authors' original work. All participants engaged in the research voluntarily and anonymously. Their data are stored in coded materials and databases without personal data.
This study was reviewed and approved by the Ethics Committee of the University of Sciences and Humanities (registration code: Act CEI N° 069, Cod. 033-2025).

Data availability statement
Data are available upon request from the corresponding author.

Declaration on using artificial intelligence in research and manuscript preparation
The authors did use AI technologies in the preparation of the manuscript, but not in their research. ChatGPT was used exclusively to optimize academic writing, including improving clarity, coherence, and grammar. No AI tools were used for study design, data collection, statistical analysis, interpretation of results, or generation of scientific content.

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ORCID
Daniel E. YUPANQUI-LORENZO https://orcid.org/0000-0002-8977-2888
Ivan DIAZ-LEON https://orcid.org/0000-0003-0037-0442
Luis PALAO-LOAYZA https://orcid.org/0000-0003-3438-501X
Mario REYES-BOSSIO https://orcid.org/0000-0003-4655-1927
Carlos CARBAJAL-LEÓN https://orcid.org/0000-0001-6714-519X
Eduardo CÁRCAMO-ZEPEDA https://orcid.org/0000-0001-9579-6109
Marlon Elías LOBOS RIVERA https://orcid.org/0000-0002-7995-6122
Ma. De Lourdes CUELLAR-HERNÁNDEZ https://orcid.org/0000-0003-4646-6220

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