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RESEARCH ARTICLE

Evaluation of the psychometric properties of the mood states assessment scale in Peruvian population groups

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ABSTRACT

Mood state is an important component of mental health, and its evaluation requires valid and reliable instruments adapted to the sociocultural context of application. The present study evaluated the psychometric properties of the mood states assessment scale (MSAS) in the Peruvian population. An instrumental design was used with a sample made up of adolescents, young people, adults and older adults (2220), collected during the last semester of 2024. A confirmatory factor analysis was applied, confirming the structure of four dimensions: depression, anxiety, joy and hostility, evidencing an adequate adjustment ($\chi 2(98) = 2186.15$; CFI = .989; TLI = .987, RMSEA = .069; SRMR = .047), and for the reliability of the scale, values from .90 to .95 (Cronbach's Alpha and Omega) were found in the dimensions of the scale. Therefore, it is concluded that the MSAS is presented as a brief, reliable and theoretically sound instrument for emotional assessment in the Peruvian population.

Keywords: mood states; psychometric properties; instrument validation; factor analysis; Peruvian population

1. Introduction

The evaluation of emotional states represents an important line of research for social psychology, due to its direct influence on mental health, personal well-being and social adaptation[1], therefore, having brief, valid and reliable instruments is essential for clinical work as well as for basic research.

Mood states are the transitory affective experiences of short duration that are activated in specific situations of the environment or the subjectivity of the person. These reactions involve components such as cognitive, physiological and behavioral, and are characterized by their momentary and fluctuating nature, unlike emotional traits that are more stable over time[2].

Therefore, emotional states can be classified into two groups, positive emotions (such as well-being and joy), and negative emotions (such as sadness, anger, anxiety)[3]. These emotions fulfill an adaptive function, allowing the person to adjust quickly and effectively to the demands of the environment, favoring both survival and social interaction[4].

In addition, emotional states experience significant variations depending on the stage of development, in

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adolescence, emotions are usually intense and unstable due to hormonal changes and the search for identity, with the presence of anxiety, irritability and sadness being common[5]. In youth, although certain negative emotions associated with academic or work stress persist, positive emotions linked to personal achievement and autonomy also emerge, with advances in emotional self-regulation.

During adulthood, greater emotional stability is observed, because of more effective coping strategies; emotions such as calm and commitment become more frequent, although they can coexist with family or work tensions[6]. And in older adulthood, people tend to experience positive emotions as well as negative effects, prioritizing significant bonds, although factors such as loss or physical health can generate sadness or anxiety in several older adults, therefore, these changes reflect the evolution in the way of feeling, interpreting and managing emotions, there is a need to evaluate them according to the life cycle[7].

From a social psychology perspective, assessing these states is essential to identify patterns of emotional well-being and discomfort, understand automatic control processes, and develop specific interventions in various areas such as clinic, education, or work[4].

On the other hand, the main theoretical foundation of the mood rating scale (MSAS) is found in the differential theory of emotions[8]. The theory explains that there are universal basic emotions, such as joy, sadness, anger, and anxiety, fulfilling essential adaptive functions and can be identified through subjective experience, facial expression, and physiological activation.

In addition, emotions are discrete processes with a biological basis, which are activated in situations relevant to the person, each emotion has a specific function that contributes to self-regulation, social communication and decision-making[9]. In fact, MSAS builds on this perspective by including a direct measurement of four primary emotions, considered as fundamental representations of the human affective state[10].

Likewise, MSAS considers a dimensional approach by assessing both negative and positive emotions on a quantitative scale, allowing a momentary emotional profile of the person to be obtained[11]. It also incorporates elements of cognitive theories, considering that mood can be influenced by the subjective interpretation of the context, consistent with the approaches of Schachter and Singer[12] and Lazarus[13], highlighting the role of cognitive evaluation in emotional experience.

Similarly, social cognitive theories point out that emotional states are not automatic reactions but depend on how people interpret and evaluate their experiences based on their previous learning and their social context[14]. Thus, emotions are modulated by beliefs and cultural norms or expectations of the reference groups; This approach allows emotions to be understood as dynamic processes, integrating individual and social factors.

On the other hand, theories of social psychology help to understand that emotional states are not limited to individual processes but are configured in interaction with group and contextual factors. The theory of social identity[15] explains how belonging to groups influences the way we feel and regulate emotions; while models of emotional contagion[16] highlight that emotions can spread between people through imitation and affective synchrony.

In summary, MSAS is supported by an integrative approach that considers emotions as discrete, measurable and functional phenomena, where evaluation can be carried out quickly and validly through self-perception, in relation to differential theory and dimensional models of emotions.

Although this scale has shown adequate psychometric properties in various European populations, its application in different sociocultural contexts[11] requires rigorous validation that considers contextual,

linguistic and demographic variables of the country; in addition, some previous studies have explored the internal structure of MSAS in specific populations in Peru, but there is still a lack of research documenting its psychometric properties in large and heterogeneous samples representing the general population.

In this sense, some previous studies were found in the Peruvian context that validated the scale, Becerra et al.[17], validated the scale during the Covid-19 pandemic in university students, the explored structure ratified the 4 dimensions through exploratory factor analysis (EFA) and the reliability indices were .92 (high reliability); Giuria et al.[18] validated the scale in Peruvian adults with confirmatory factor analysis (CFA) finding adequate indices of structural validity, however, the internal consistency was moderate; and Quezada et al.[19], found an adequate factor model and good reliability indices in a small sample of adults.

In addition, in the Peruvian sociocultural context, characterized by its ethnic, regional and linguistic diversity, it significantly influences the way people express and interpret their emotions. Social norms can value emotional containment as a sign of strength and prioritize group well-being over individual expression, thus modulating the manifestation of emotions such as sadness, fear or joy. Therefore, when assessing emotional states with instruments such as MAS, it's essential to consider these sociocultural aspects to interpret them in a contextualized and culturally relevant way [20].

However, most of these studies have been carried out in specific urban areas, with samples that are not representative at the national level, limiting the generalization of the results; Also, some studies did not incorporate confirmatory factor analysis. On the other hand, the elderly population has been scarcely evaluated and the existing studies in this group have not carried out formal psychometric validations of the instrument.

In view of this situation, it is necessary to carry out a new psychometric study of MSAS in a diverse and representative sample of the general Peruvian population, validating the instrument in different cultural contexts, geographical regions and age groups guarantees its diagnostic usefulness and clinical follow-up, in addition to strengthening its application in psychological research, community mental health programs and emotional well-being monitoring.

Likewise, a comprehensive evaluation will allow confirming or adjusting the factorial structure of the instrument, as well as optimizing its measurement properties to ensure that the results obtained validly and reliably reflect the affective states in the current Peruvian sociocultural reality.

For this reason, the use of MSAS focuses on more specific moods, being more useful than general scales such as Likert scales; Likewise, the scale can be administered quickly, being an efficient option for large-scale research or rapid evaluations in clinical settings, and simplicity is a component that describes adjectives about moods, facilitating their understanding and application compared to other scales.

Therefore, the present study aims to evaluate the psychometric properties of the mood states assessment scale in different population groups (adolescents, youth, adults and older adults. Likewise, it´s intended to determine the relevance of the socio-emotional dimension to be used as a tool for emotional evaluation in diverse contexts and samples in the country.

2. Method

2.1. Type of study

The study was instrumental [21], with the purpose of analyzing the psychometric properties of the instrument in a representative sample of the Peruvian population. Data collection was carried out during the second half of 2024.

2.2. Participants

2283 people participated in the study, intentionally chosen, the following inclusion criteria were followed: older people from 12 years of age, of both sexes, reading and writing skills, and without serious sensory problems, those selected formed population groups according to life stages such as: adolescents, youth, adults and older adults; Children under 12 years of age, people with sensory problems and people who did not wish to participate voluntarily in the research were excluded.

2.3. Instrument

The mood states assessment scale (MSAS) was adapted and validated by Sanz [11]; it´s a brief self-report tool designed to measure a person's immediate emotional state. The scale is composed of 16 items that explore how the person feels at a certain moment, uses a Likert-type scale for 11-point responses (0 is nothing and 10 is a lot), allowing to capture the subjective intensity of the emotional state experienced; Likewise, the structure of the instrument is divided into 4 dimensions (anxiety, depression, hostility and joy). Each of these dimensions provides both a negative and positive emotional profile. Likewise, the structure presents construct validity (exploratory factor analysis with the principal axis method and oblique rotation); for reliability, Cronbach's alpha coefficient was used, finding values between .86 and .96 according to the subscales. In addition, it presents convergent and discriminant validity, correlating significantly with the positive and negative affect, state-trait anxiety inventory and Beck's depression inventory.

2.4. Procedure

The following aspects were considered for the application of the instrument: The adolescents were selected in the educational centers with the prior authorization of the directors, informing their families and students about the objectives of the study and agreeing to participate voluntarily; In the case of young people, a strategy was used to contact them in the places where they carry out their main activities (study, work, leisure and/or recreation) by locating them at the exit doors of universities, in sports and recreation centers; in the case of adults, they were contacted in the main shopping, food and recreation centers; and in the case of older adults, the main points to contact them were health centers and local community shelters. Likewise, participation was confirmed through informed consent. The instrument was applied individually on paper and with the presence of an applicator to resolve doubts in the event of any eventuality, in addition, the information collected is confidential, assuming the safeguarding of the data provided.

2.5. Ethical considerations

The research was carried out following the ethical guidelines established by the Ministry of Health of Peru, in accordance with ministerial resolution No. 233-2020, seeking to guarantee that health studies with human participation are carried out under ethical principles. The study was also carried out in accordance with the principles set out in the Declaration of Helsinki.

2.6. Data analysis

The data was digitized in a Microsoft Excel spreadsheet. For the analyses, the statistical software R and its RStudio programming environment were used. The data were imported from the openxlsx library [22]. For the cleaning and description of the data, the tidyverse [23] and psych [24] libraries were used. The descriptive analyses were carried out considering the nature of the variables, in the case of categorical variables, frequency tables were used, and in the case of numerical variables, descriptive statistics were used.

Correlations were analyzed using polychoric matrices due to the ordinal nature of the items of the instrument evaluated. Confirmatory factor analysis (CFA) was applied to evaluate the evidence based on internal structure. The analyses were carried out with the lavaan [25] and semPlot [26] libraries. For the

evaluation of the adjustment indices, the following criteria were taken into account: values ≥ 0.90 and ≥ 0.95 in the CFI and TLI as adequate fit and good fit respectively, values ≤ 0.08 and ≤ 0.05 in the RMSEA as adequate fit and good fit respectively and for the SRMR, the values ≤ 0.08 and ≤ 0.06 were considered as good fit and ideal respectively [27].

Reliability was evaluated with Cronbach's alpha and McDonald's omega coefficients using the MBESS [28] and psych [22] packages, considering values greater than 0.70 as high internal consistency. Finally, a proposal for a scale is prepared with five categories according to percentile scores.

3. Results

The sample included various population groups such as adolescents, young people, adults and older adults, with an average age of 39.25 years and a standard deviation of 18.05 years, within a range of 12 to 93 years; Of the total number of participants, 39.9% were men and 60.1% women.

Table 1 presents the descriptive statistics of the items, the number of records considered, the mean, the median, the standard deviation, the asymmetry and the kurtosis.

Table 1. Descriptive statistics of the MAS items

Item	M	Mdn	OF	Asim.	Curt.
1	3.67	3	2.92	0.4	-0.97
2	3.3	3	2.88	0.53	-0.89
3	5.8	6	2.73	-0.27	-0.88
4	3.55	3	2.94	0.45	-0.96
5	3.79	3	2.94	0.34	-1.05
6	5.61	6	2.8	-0.24	-0.92
7	3.38	3	2.89	0.5	-0.91
8	3.02	2	2.82	0.63	-0.75
9	3.95	4	2.98	0.26	-1.11
10	3.53	3	3.01	0.47	-1
11	3.07	2	2.82	0.59	-0.82
12	5.16	5	2.9	-0.1	-1
13	3.82	4	2.95	0.34	-1.03
14	3.02	2	2.84	0.63	-0.76
15	5.77	6	2.76	-0.29	-0.86
16	3.46	3	2.95	0.51	-0.92

The average value ranged from 3.02 to 5.8 points. On the other hand, the values of asymmetrical and kurtosis are within range 2, which means that the items follow approximate distributions to the normal distribution.
Table 2 shows the matrix of polychoric correlations between the items of the instrument analyzed. It is observed that the correlations ranged from -.04 to .92. Correlations of varying magnitude are observed between the items, suggesting the existence of a multidimensional structure in the scale.

Table 2. Matrix of polychoric correlations of MAS items

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1															
2	.72	1														
3	.1	.04	1													
4	.7	.72	.05	1												

5	.77	.77	.09	.76	1											
6	.14	.08	.73	.12	.15	1										
7	.73	.76	.04	.78	.79	.11	1									
8	.71	.82	.05	.74	.76	.1	.77	1								
9	.77	.73	.07	.73	.79	.11	.73	.7	1							
10	.71	.74	-.03	.76	.77	.05	.79	.73	.74	1						
11	.71	.82	.04	.74	.77	.09	.77	.93	.71	.75	1					
12	.25	.21	.64	.2	.24	.68	.21	.22	.2	.15	.23	1				
13	.71	.71	.08	.72	.75	.13	.71	.7	.73	.72	.71	.22	1			
14	.69	.82	.04	.73	.75	.12	.76	.9	.69	.74	.89	.22	.69	1		
15	.12	.04	.84	.05	.08	.73	.04	.06	.07	-.02	.05	.66	.08	.06	1	
16	.72	.74	.03	.8	.76	.06	.78	.77	.73	.79	.77	.16	.72	.76	.02	1

A confirmatory factor analysis was applied with the structure of four dimensions: Depression (items: 4, 7, 10, 16), Anxiety (items: 1, 5, 9, 13), Joy (items: 3, 6, 12, 15) and Hostility (items: 2, 8, 11, 14). The results show an adequate fit ($\chi 2(98) = 2186.15$; *CFI* = .989; *TLI* = .987, *RMSEA* = .069; SRMR = .047). **Table 3** presents the goodness-of-fit indices of the model evaluated.

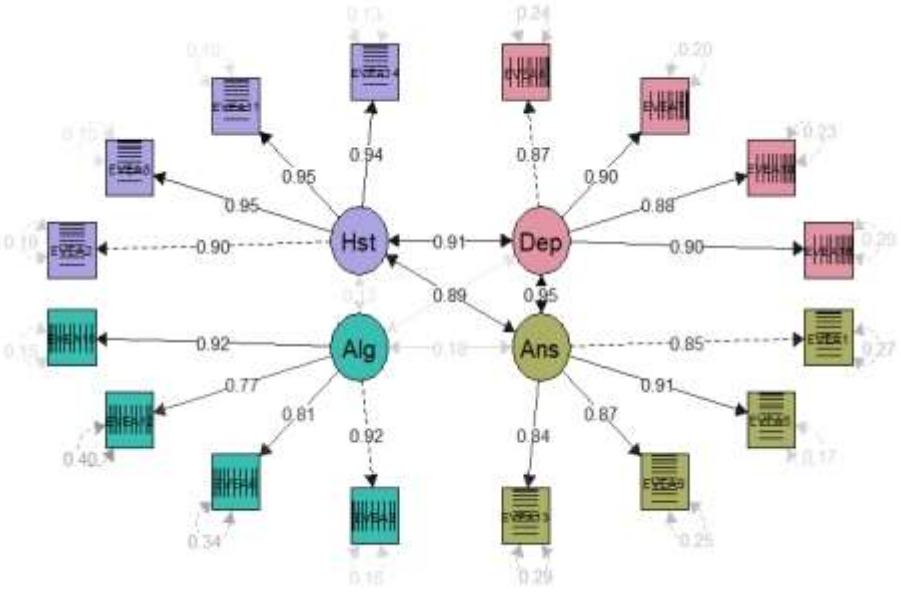
Table 3. Goodness-of-Fit Indices of the Four-Dimensional Model

Model	X^2	*Gl*	*CFI*	*TLI*	*RMSEA*	*SRMR*
Four dimensions	2545.53*	98	.988	.985	.068	.047

*p< .001.

These results suggest that the data presents a good fit to the four-dimensional model, which means that there is evidence in favor of this structure of the constructed studied. Additionally, it is observed that all factor loads were greater than .77. Figure 1 shows the factor loads of the evaluated model.

Figure 1. Factor loads of the four-dimensional model of the MAS



Regarding reliability, the internal consistency in the dimensions of the instrument was evaluated. In the Depression dimension, a Cronbach's alpha of .93 (95% CI: .92 - .93) and a McDonald's Omega of .93 (95% CI: .92 - .94) were obtained. In the Anxiety dimension, a Cronbach's alpha of .92 (95% CI: .91 - .92) and a McDonald's Omega of .92 (95% CI: .91 - .93) were obtained. In the Joy dimension, a Cronbach's alpha of .90 (95% CI: .90 - .91) and a McDonald's Omega of .90 (95% CI: .89 - .91) were obtained. In the Hostility

dimension, a Cronbach's alpha of .95 (95% CI: .95 - .96) and a McDonald's Omega of .95 (95% CI: .95 - .96) were obtained. These results indicate that the scale has high internal consistency.

Table 4 presents the percentiles of the MSAS scores. 5 categories are shown ranging from very low to very high mood. For interpretation, it must be considered that a higher score represents a higher level of mood, according to the dimension, of the person being evaluated.

Table 4. Percentile Rating for MSAS

Percentiles	Depression	Anxiety	Joy	Hostility	Levels
10	0 – 1	0 – 2	0 – 8	0	Very low
25	2 – 5	3 – 6	9 – 15	1 – 3	Low
50	6 – 12	7 – 14	16 – 23	4 – 10	Middle
75	13 – 22	15 – 24	24 – 30	11 – 20	High
90	23 - 40	25 - 40	31 - 40	21 - 40	Very high

4. Discussion

It was proposed to evaluate the psychometric properties of the mood states assessment scale in different Peruvian population groups (adolescents, youth, adults and older adults), in this sense, the results confirm the structural validity of the MSAS in the general population, evidencing an adequate fit of the model of four dimensions: depression, anxiety, joy and hostility. The indicators obtained in the confirmatory factor analysis (CFA) $\chi 2(98) = 2186.15$; *CFI* = .989; *TLI* = .987, *RMSEA* = .069; SRMR = .047, meet the criteria established in the psychometric literature to consider an acceptable and well-fitting model [29].

These results are consistent with previous studies carried out in the European context, where the four-factor structure proposed by Sanz [11] demonstrated a satisfactory fit. Likewise, the findings replicate and expand the evidence obtained in Peruvian research [17-19].

The high value of CFI (.989) and TLI (.987) indicates that the proposed model explains a large part of the covariance observed in the data, while the RMSEA (.069) and the SRMR (.047) are within the recommended ranges (<.08) [27], substantiating the relevance of the theoretical structure in this population. In addition, the factorial stability of MAS in different Peruvian sociocultural contexts shows that the emotional dimensions evaluated (depression, anxiety, joy and hostility) are conceptually equivalent and understandable for the participants, regardless of their age or background.

Therefore, these results have relevant implications for professional practice and psychological research in the country, validating a brief and reliable instrument such as the MSAS allows its use in rapid emotional assessments in clinical, educational and community contexts, favoring the detection of affective alterations and the planning of timely interventions.

However, it is recommended to continue evaluating the factorial invariance by sex, age, and geographic region, as well as to analyze the convergent and discriminant validities with other emotional scales [30], to strengthen the psychometric evidence of the instrument and ensure its rigorous application in various Peruvian populations.

With respect to the sample size, it is one of the main strengths of the present study, because including many participants guarantees more accurate estimates in the CFA, as well as greater stability in the adjustment indices obtained [31]. In this sense, large sample sizes allow for increased statistical power and reduced estimation errors, a fundamental aspect considering that MSAS evaluates multiple emotional dimensions simultaneously.

On the other hand, the inclusion of older adults in the sample represents a significant advance compared to previous studies carried out in Peru [14-16], where this population group had been underrepresented; Incorporating older adult participants in the validation of the MSAS allows verifying that the items are understandable and culturally relevant for this population, ensuring that the factor structure remains stable throughout the life cycle [6]. In addition, it ensures that the scale is suitable for use in clinical and community contexts where the assessment of the emotional state of older people is a priority, given their vulnerability to affective alterations such as depression and anxiety [32].

Therefore, the results of the present study, which include adolescents, young people, adults, and older adults, expand the external validity of MSAS in the Peruvian population, strengthening its application as a brief, reliable tool with robust factorial evidence to assess mood in different groups, populations, and cultural contexts.

Likewise, the dimensional theory of emotions, which maintains that affective states can be organized into basic dimensions such as positive and negative affect, is supported by the factor structure of MSAS, the four dimensions reflect a conceptualization consistent with theoretical models of affectivity, such as the two-dimensional model proposed by Watson and Tellegen [33], where emotions can be located according to their valence and level of activation.

And the structural validity observed in the present study confirms the theoretical solidity of the affective model on which the MSAS was built. This instrument is based on a multifactorial vision of transient emotional states, coinciding with approaches that understand mood as a momentary phenomenon, modulable by contextual factors and susceptible to being measured dimensionally [11].

On the other hand, the systematic assessment of mood through instruments such as the MSAS has important applications in the promotion of psychosocial well-being. It´s use allows early identification of emotional alterations, such as anxiety, depression and hostility, facilitating the implementation of preventive strategies in schools, communities and work environments to strengthen collective mental health [34].

Therefore, assessing the emotional state of population groups is important for the mitigation of social conflicts, since knowing the levels of hostility, frustration or hopelessness in certain communities can guide psychosocial interventions that promote cohesion, dialogue and the construction of healthier relationships [35]. The information obtained can guide socio-emotional education programs, development of coping skills and peaceful resolution of conflicts, contributing to the reduction of social tensions and strengthening coexistence.

In summary, the MSAS not only plays a diagnostic role, but also constitutes a strategic tool in social psychology reflecting the prevalence of emotional states related to chronic stress, job insecurity or community violence, phenomena that especially affect vulnerable populations, limiting their psychological well-being, aspects that can contribute to the design of community mental health policies and promote more resilient and emotionally resilient societies balanced.

On the other hand, the evaluation of emotional states allows the design of social and mental health interventions adapted to each stage of life, in adolescents and young people, it can help prevent anxiety, depression or school violence, the management of academic stress, and the development of socio-emotional skills. In adults, it guides actions to reduce work stress and improve well-being. And in older adults, it facilitates the detection of loneliness, sadness and hopelessness, facilitating community support programs. Thus, emotional assessment contributes to improving quality of life and collective psychosocial well-being.

During the development of the research, some limitations were presented. First, the study using a cross-sectional design constitutes a limitation because the temporal stability of the measurements does not allow establishing causal relationships between emotional states and other psychological or sociodemographic variables. Second, the non-probabilistic sample reduces the level of representativeness of the results, does not guarantee that all population sectors of the country have had the same probability of being included, limiting the generalization of the results. And the lack of analysis of factorial invariance according to sex limits the measurement of emotional dimensions in an equivalent way in different segments of the population.

Finally, the results suggest that future research should carry out longitudinal studies to evaluate the temporal stability and predictive validity of MSAS, as well as the analysis of factor invariance, recommending the development of cross-cultural studies and specific adaptations for populations such as children or people with chronic diseases, thus expanding its applicability in different contexts of psychological evaluation in Peru.

Conflict of interest

The authors declare that they have no conflict of interest.

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