GRUPO EDITORIAL DE PSICOFUNDACIÓN

Revista de Psicoterapia (2025) 36(130) 99-107

Revista de Psicoterapia

https://revistadepsicoterapia.com • e-ISSN: 2339-7950

Universidad Nacional de Educación a Distancia (UNED)

Systematic review

Exploring Metacognition in a Spanish-Speaking Population: Adaptation and Validation of the Metacognition Self-Assessment Scale (MSAS)

Miquel Alabèrnia-Segura[1, 2], Danielle Mullins[1], Anna Carulla-Flix[3], & Guillem Feixas[1, 4]

[1] Department of Clinical Psychology and Psychobiology, Universitat de Barcelona, Barcelona, Spain
[2] Psychiatry, Mental Health and Addictions Research Group, Vall d'Hebron Research Institute (VHIR), Barcelona, Spain
[3] Private practice, Barcelona, Spain
[4] Institute of Neurosciences, Universitat de Barcelona, Barcelona, Spain.

ARTICLE INFO

Received: August 14, 2024
Accepted: November 11, 2024

Keywords:
Self-awareness
Assessment
Psychotherapy
Mentalizing
Factor structure
Psychometrics

ABSTRACT

The study aimed to adapt and validate the Metacognition Self-Assessment Scale (MSAS) for Spanish-speaking populations. Metacognition, a multi-dimensional construct, holds a crucial role in understanding diverse psychological disorders and cognitive processes. Employing a modular approach to metacognition, the investigation focuses on specific sub-functions of metacognition such as self-monitoring, self-evaluation, and strategy selection. A sample of 138 Spanish-speaking individuals partook in the study, which encompassed the translation of the MSAS and the execution of reliability and validity tests. The results from confirmatory factor analysis support the original four-factor structure of the MSAS, including Self-Reflectivity, Critical Distance, Understanding Other Minds, and Mastery. Additionally, the study established convergent validity of the MSAS with the Toronto Alexithymia Scale (TAS-20), demonstrating a strong negative correlation between the two instruments. This adaption and validation of the Spanish version of the MSAS provides with a valuable instrument ready for clinical and investigative purposes. This contribution set the stage for future research on the role of metacognitive processes in psychological well-being, mental health, and in the psychotherapeutic process.

Explorando la Metacognición en Población de Habla Hispana: Adaptación y Validación de la Escala de Autoevaluación de la Metacognición (MSAS)

Palabras clave:
Aautoconocimiento
Evaluación
Psicoterapia
Mentalización
Estructura factorial
Psicometría

RESUMEN

El presente estudio tiene como objetivo adaptar y validar la Escala de Autoevaluación de la Metacognición (MSAS) para población de habla hispana. Empleando un enfoque modular de la metacognición, esta investigación se centra en analizar subfunciones específicas de la metacognición, como la auto-monitorización, la autoevaluación y la selección de estrategias. Una muestra de 138 individuos de habla hispana participó en el estudio, que incluyó tanto la traducción del MSAS, como la realización de pruebas de fiabilidad y validez. Los resultados del análisis factorial confirmatorio apoyan la estructura original del MSAS, que incluye cuatro factores: Autorreflexión, Distancia Crítica, Comprensión de la Mente del Otro y Dominio. Además, se estableció la validez convergente del MSAS con la Escala de Alexitimia de Toronto (TAS-20), demostrando una fuerte correlación negativa entre ambos instrumentos. Esta adaptación y validación de la versión en español del MSAS proporciona un valioso instrumento disponible para fines clínicos y de investigación. Esta contribución sienta las bases para investigar el papel de los procesos metacognitivos en el bienestar psicológico, la salud mental y el proceso psicoterapéutico.

Cite as: Alabèrnia-Segura, M., Mullins, D., Carulla-Flix, A. & Feixas, G. (2025). Exploring metacognition in a spanish-speaking population: adaptation and validation of the Metacognition Self-Assessment Scale (MSAS). *Revista de Psicoterapia, 36*(130), 99-107. https://doi.org/10.5944/rdp.v36i130.42041
Corresponding author: Danielle Mullins, MSc, dmullimu15@alumnes.ub.edu

Exploring Metacognition in a Spanish-Speaking Population: Adaptation and Validation of the Metacognition Self-Assessment Scale (MSAS)

The concept of metacognition, initially introduced by Flavell (1979), has undergone a profound transformation over the past few decades, becoming a cornerstone in cognitive psychology. This multi-dimensional construct encompasses a broad range of cognitive abilities that surpass its original conceptualization. These abilities include self-regulation, decision-making, social cognition, theory of mind (previously termed "sociality" by Kelly, 1955/1991), and introspective accuracy, among other cognitive processes (Efklides, 2008). In the clinical domain, the significance of metacognition is underscored by its applicability in understanding a range of severe mental disorders, psychosis, and personality disorders in particular. For instance, in schizophrenia, poor metacognitive abilities have been associated with diminished social skills and neuropsychological deficits (Lysaker et al., 2011). A more comprehensive understanding of metacognition offers an integrated approach to treatment, not only addressing the symptoms but also targeting the underlying cognitive processes contributing to these disorders (Semerari et al., 2003). It is of interest for psychotherapy practice and research, as postulated by Semerari et al. (2002; 2014; see also Dimaggio et al., 2007), that metacognitive processes play a crucial role in understanding personality disorders. Moreover, patients may exhibit varying degrees of difficulties across metacognitive functions. For example, patients diagnosed with paranoid personality disorder may demonstrate dysfunction in decentration and differentiation metacognitive functions. Meanwhile, patients diagnosed with narcissistic personality disorders may exhibit difficulties in recognizing their own emotions and linking them to the external events.

The study of metacognition offers a significant framework for examining the intricacies of the psychological processes that determine mental health. It offers a profound insight into how individuals perceive, interpret, and respond to their internal and external environments. Given its pivotal role in mental health and cognitive functioning (e.g., deep learning, see Elbyaly & Elfeky, 2022), there has been an increased demand for reliable and valid tools to assess metacognitive abilities.

The contemporary comprehension of metacognition is predominately shaped by two overarching frameworks: the unitary and the modular approaches. The unitary approach, as exemplified by the Self-Regulatory Executive Function model (S-REF), asserts that metacognition is a continuum of interconnected abilities based on thought content (Wells & Matthews, 1994). According to this perspective, metacognitive abilities operate as an integrated system that impacts various cognitive processes, including attention, memory, and problem-solving. Dysfunctions in metacognition are viewed as central to the onset and persistence of psychological difficulties. Higher-order metacognitive beliefs drive these cognitive processes and ruminative cycles, sustaining maladaptive thinking patterns and increasing vulnerability to symptoms and psychopathology (Wells, 2000; Wells & Matthews, 1994). The S-REF model has been particularly useful in understanding how certain metacognitive beliefs contribute to emotional disorders, thereby presenting opportunities for therapeutic interventions tailored for children (Muir et al., 2023).

The modular approach, represented by the Metacognitive Multi-Function Model (MMFM), is distinctive from the unitary approach because it focuses on the mental functions and operations that constitute metacognition, rather than mental contents (Semerari et al., 2003). The MMFM breaks down metacognition into relatively independent sub-functions, including self-monitoring, self-evaluation, and strategy selection. This approach suggests that metacognitive dysfunctions are associated with psychopathology due to impairments in understanding one's own and others' mental states and processes (Dimaggio et al., 2007). These metacognitive difficulties hinder the development of stable self and other representations, which are essential for maintaining functional interpersonal relationships and self-regulation (Lysaker et al., 2011; Semerari et al., 2014). By isolating these discrete functions, the MMFM offers a more comprehensive understanding of metacognition and its role in psychopathology. This modular approach enables tailored evaluations and interventions by pinpointing specific areas of difficulty within metacognitive abilities.

Several tools have been developed to evaluate metacognition, each having its own set of advantages and limitations. Methods such as interviews and discourse analyses provide an in-depth understanding of one's metacognitive abilities but demand some time and specialized training (Semerari et al., 2003). These include already validated instruments such as the Metacognition Assessment Interview (MAI), a semi-structured clinical interview (Pellecchia et al., 2015; Semerari et al., 2012), and the Metacognition Assessment Scale (MAS), a rating scale for assessing metacognition in psychotherapy transcripts or narrative interviews (Carcione et al., 2008; Semerari et al., 2003). Self-report instruments such as the Metacognition Self-Assessment Scale (MSAS) have been developed because they are convenient and less time demanding (Pedone et al., 2017). However, they may be constrained by the individual's level of self-awareness and introspective accuracy (Efklides, 2008). These tools enable researchers and clinicians to systematically assess changes in metacognitive abilities over time, thereby providing insights into how metacognition contributes to therapeutic outcomes.

The MSAS, anchored in the MMFM framework and modular approach to metacognition, is a meticulously designed tool intended for a comprehensive assessment of an individual's diverse metacognitive capabilities (see Table 1). The MSAS is an 18-item self-report measure that utilizes a five-point Likert scale (1 = *Never*, 2 = *Rarely*, 3 = *Sometimes*, 4 = *Frequently*, 5 = *Almost always*) for response evaluation. It has been found to have a four-factor structure that aligns with the metacognitive abilities outlined in the MMFM: 1) Self-Reflectivity, involving monitoring and integrating one's own mental states; 2) Critical Distance, which encompasses differentiation and decentration; 3) Understanding Other Minds; and 4) Mastery, entailing the capacity to solve problems and cope with stressors (Faustino et al., 2021; Pedone et al., 2017). The original MSAS validation study demonstrated satisfactory reliability across all subscales, with Cronbach's alpha ranging from .72 to .87 (Pedone et al., 2017). The validation also included confirmatory factor analyses (CFA) with two subsamples from the general population of Naples, which confirmed the MSAS's robustness and utility for metacognitive assessment through satisfactory model fit. Faustino and colleagues (2021) conducted a validation study of the MSAS in the general Portuguese population, demonstrating its reliability

and validity across diverse cultural contexts. Their analysis, based on an exploratory factor analysis (EFA) with a sample size of n = 194 (80.6% female), confirmed the four-factor structure originally proposed by Pedone et al. (2017). The scale exhibited satisfactory psychometric properties, with Cronbach's alpha for the total MSAS scale yielding an acceptable level of internal consistency (α = .88). Moreover, test-retest procedures confirmed the scale's temporal stability, reinforcing its reliability over time. Construct validity was evidenced through significant Pearson correlations among the subscales and the total scale, suggesting robust inter-correlations within metacognitive domains.

Despite this, a significant gap exists in the availability of such tools for Spanish- speaking populations. The influence of cultural and linguistic factors on the reliability and validity of metacognitive assessments underscores the importance of adapting and validating the MSAS for Spanish-speaking populations. By serving as a valuable instrument for clinicians and researchers, this adaptation not only contributes to the expanding body of cross-cultural studies in psychology, but also ensures the preservation of the tool's reliability and validity across different linguistic contexts.

The primary objective of this study is to adapt the MSAS for a Spanish-speaking population and to examine its psychometric properties. This entails a comprehensive process, encompassing the translation of the scale, verification of its cultural relevance, and the execution of reliability and validity assessments. The study aims to establish whether the Spanish version of the MSAS preserves the original scale's four-factor structure. Through these efforts, the research aspires to provide a robust and culturally attuned tool suitable for diverse settings in the Spanish-speaking population, thereby contributing to the overall advancement of our knowledge of metacognition and its varied functions.

Method

This psychometric study has received ethical approval from the Bioethical Committee of the *Universitat de Barcelona* (IRB00003099).

Participants

The study was based on a convenience sample who were invited to respond to the questionnaire. The inclusion criteria of the study were (1) to be of legal age (18 years or older), and (2) have a sufficient comprehension of Spanish.

Participants were recruited by disseminating the questionnaire through social networks via a link that redirected an *ad hoc* online survey using *Microsoft Forms*. The survey included basic sociodemographic information and their responses to the MSAS and the Toronto Alexithymia Scale (TAS-20). A total of 138 individuals (93 females) agreed to participate in the study and signed the informed consent. The average age was approximately 34 years (SD = 16.04).

Instruments

Metacognition Self-Assessment Scale (MSAS)

To create a Spanish adaptation of the MSAS, we employed a rigorous translation and back-translation methodology based on the framework established by Triandis (1980). Two expert translators, fluent in both Spanish and English and experienced in cross-cultural settings, were enlisted for this task.

The first translator was a professional linguist, while the second was an academic with a deep understanding of Psychology and a track record of adapting English-language questionnaires for Spanish-speaking populations. Initially, the academic translated the questionnaire into Spanish. Subsequently, the professional linguist translated it back into English without prior exposure to the original English version. This dual-translation approach was followed by a comparative review of the back-translated and original English versions to ensure semantic integrity. A collaborative meeting with both translators and additional Ph.D. students was convened to scrutinize the accuracy of individual items and reconcile any discrepancies with the original English version. This iterative process was repeated until linguistic congruence was achieved (see Table 1 for the MSAS in Spanish resulting from this process). See the introductory section for more details about the MSAS.

Toronto Alexithymia Scale (TAS-20)

The TAS-20 is an assessment used to measure alexithymia, a construct inversely related to metacognition (Taylor et al., 2003). It consists of 20 items belonging to three distinct factors: Factor I focuses on the difficulty in identifying feelings; Factor II pertains to the difficulty in describing feelings to others; and Factor III is concerned with externally oriented thinking. The TAS-20 uses a 5-point Likert-type response scale (ranging from "strongly disagree" to "strongly agree") and was used in this study to assess its convergent validity with the MSAS. The Spanish version of the TAS-20 (Martínez Sánchez, 1996) demonstrated excellent internal consistency (α = .78 for the total group, α = .82 for men, and α = .77 for women) and good test-retest reliability (r = .72; p < .001).

Procedure

The MSAS (Pedone et al., 2017) was adapted to a Spanish-speaking population utilizing a back-translation of the items to ensure integrity to the original questionnaire. The translated scale and the already validated TAS-20 were disseminated through a link on social networks. To obtain a heterogeneous sample, it was distributed among people of different ages using the snowball method.

Prior to their involvement, participants were informed on the research goal and characteristics of the study. Those who agreed to participate signed the informed consent. Subsequently, they completed the online *ad hoc* survey, which included the sociodemographic form, MSAS and the TAS-20. The data was collected anonymously and was authorized through the acceptance of the informed consent by the participants.

Data Analysis

First, the descriptive statistics were computed for the MSAS, including mean, standard deviation (SD), skewness, and quantile scores. The four-factor model of the MSAS was tested and compared using a chi-squared (χ^2) difference test extracted from the ANOVA function in the R Studio stats package (R Core Team, 2018). Maximum likelihood with robust standard errors was

employed to estimate the CFA parameters. Model fit was evaluated using indices including RMSEA (< .08, I.C. 90%), χ^2 [*p*-value], CFI > .95, and Tucker-Lewis index (TLI) > .9, as suggested in previous literature (Erkut, 2010). The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were also used to assess model fit. Given that Cronbach's α may not be ideal for all scales, we also computed the total McDonald's omega coefficient (ω) (Viladrich et al., 2017) for these reliability estimates, using the *psych* package (Revelle, 2023) and formulated through structural equation modeling (SEM). To further validate the MSAS adaptation, its relationship with the TAS-20 was examined. It was hypothesized that specific subscales of the MSAS would negatively and significantly correlate with corresponding factors of the TAS-20. Multiple regression analyses were performed to explore these associations while controlling for other variables.

Results

Table 2 shows the descriptive statistics of the Spanish adaptation of the MSAS. Figure 1 displays the histograms representing the distribution of the scores of the subscales.

Table 1
Translated and Adapted Items of the MSAS: The Spanish Version

A	***CON RESPECTO A MÍ MISMO, HABITUALMENTE…***	**Nunca**	**Raramente**	**A veces**	**Frecuentemente**	**Casi siempre**
1.	Puedo distinguir y diferenciar mis propias capacidades mentales (por ej., recordar, imaginar, fantasear, soñar, desear, decidir, prever y pensar).	**1**	**2**	**3**	**4**	**5**
2.	Puedo definir, distinguir y nombrar mis propias emociones.	**1**	**2**	**3**	**4**	**5**
3.	Soy consciente de cuáles son los pensamientos o emociones que guían mis acciones.	**1**	**2**	**3**	**4**	**5**
4.	Soy consciente de que lo que pienso de mí mismo es una idea y no es necesariamente cierto. Me doy cuenta de que mis opiniones pueden no ser acertadas y pueden cambiar.	**1**	**2**	**3**	**4**	**5**
5.	Soy consciente de que lo que deseo o lo que espero puede no hacerse realidad y de que tengo un poder limitado para influir en las cosas.	**1**	**2**	**3**	**4**	**5**
6.	Puedo percibir y describir claramente mis pensamientos, emociones y las relaciones en las que estoy involucrado.	**1**	**2**	**3**	**4**	**5**
7.	Puedo describir el hilo que conecta mis pensamientos y emociones incluso cuando estos difieren de un momento a otro.	**1**	**2**	**3**	**4**	**5**
B	***CON RESPECTO A LOS DEMÁS, HABITUALMENTE…***	**Nunca**	**Raramente**	**A veces**	**Frecuentemente**	**Casi siempre**
1.	Puedo entender y distinguir las distintas actividades mentales como, por ejemplo, recordar, imaginar, fantasear, soñar, desear, decidir, prever y pensar.	**1**	**2**	**3**	**4**	**5**
2.	Puedo identificar y entender las emociones de personas a quienes conozco.	**1**	**2**	**3**	**4**	**5**
3.	Puedo describir el hilo que conecta pensamientos y emociones de personas a quienes conozco, incluso cuando difieren de un momento a otro.	**1**	**2**	**3**	**4**	**5**
C	***EN CUANTO A "PONERSE EN LA PIEL DEL OTRO", GENERALMENTE…***	**Nunca**	**Raramente**	**A veces**	**Frecuentemente**	**Casi siempre**
1.	Soy consciente de que no soy necesariamente el centro de los pensamientos, sentimientos y emociones de otros, y de que el comportamiento de los demás surge de razones y metas que pueden ser independientes de mi propia perspectiva y de mi propia involucración en la relación.	**1**	**2**	**3**	**4**	**5**
2.	Soy consciente de que otros pueden percibir hechos y acontecimientos de forma distinta que yo y pueden interpretarlos de forma diferente.	**1**	**2**	**3**	**4**	**5**
3.	Soy consciente de que la edad y las experiencias vitales pueden afectar los pensamientos, emociones y comportamiento de los demás.	**1**	**2**	**3**	**4**	**5**
D	***RESPECTO A SOLUCIONAR PROBLEMAS, GENERALMENTE…***	**Nunca**	**Raramente**	**A veces**	**Frecuentemente**	**Casi siempre**
1.	Puedo lidiar con el problema imponiendo o inhibiendo voluntariamente un comportamiento propio.	**1**	**2**	**3**	**4**	**5**
2.	Puedo lidiar con los problemas intentando voluntariamente seguir mi propio orden mental.	**1**	**2**	**3**	**4**	**5**
3.	Puedo lidiar con los problemas intentando cuestionar o enriquecer mis puntos de vista y mis creencias sobre estos problemas.	**1**	**2**	**3**	**4**	**5**
4.	Cuando los problemas están relacionados con las relaciones con otras personas, intento solucionarlos en base a como creo que es su funcionamiento mental.	**1**	**2**	**3**	**4**	**5**
5.	Puedo lidiar con los problemas, reconociendo y aceptando mis limitaciones a la hora de gestionarme a mí mismo y de influir en los acontecimientos.	**1**	**2**	**3**	**4**	**5**

Table 2
Descriptive Results of MSAS Four-Factor Structure

			Quantiles		
MSAS Factor	***M (SD)***	**Skewness**	**25th**	**50th**	**75th**
Self-Reflectivity	4.08 (.64)	-.26	3.57	4.14	4.86
Critical Distance	3.91 (.49)	.06	3.67	4	4.67
Understanding Other Minds	4.36 (.48)	-.12	3.75	4.33	5
Mastery	3.73 (.62)	-.26	3	4	4

Factor Structure

Five different models were examined to evaluate the adequacy of the theoretical model with the collected data. The CFA results for the hypothesized four-factor model are available in Figure 2, which includes the factors of self-reflectivity, critical distance, other minds, and mastery. All factor loadings (*see* Figure 2) were significant, ranging from $\lambda = .22$ to $\lambda = .91$ ($p < .05$). The fit indices suggest a satisfactory model fit: χ^2 with 46 estimated parameters was 211.27, $p < .001$, RMSEA = .07, CFI = .89, TLI = .86, AIC = 5,313.84, and BIC = 5,436.79.

We performed χ^2 difference tests and observed that none of the five alternative models exhibited a superior fit to the data compared to the original four-factor model (see Table 3). Additionally, we examined the inter-factor correlations among the different scales, and they were determined to be statistically significant.

Other Minds, Mastery; Two-factor model: Self-Reflectivity and Mastery.

Reliability

As evident from the factor loadings presented in Figure 2, the standardized coefficients for the MSAS subscales exhibit a range of values varying in strength. For example, the "Self-Reflectivity" subscale produced factor loadings ranging from .23 to .85, whereas the "Other Minds" subscale demonstrated coefficients ranging from a minimum of .38 to a maximum of .91. These variations in factor loadings underscore the importance of employing robust reliability measures, such as ω, for evaluating the internal consistency of scores within a single administration. This approach allows for a nuanced evaluation of individual scores across the items of the scale, ensuring reliability within a single assessment session.

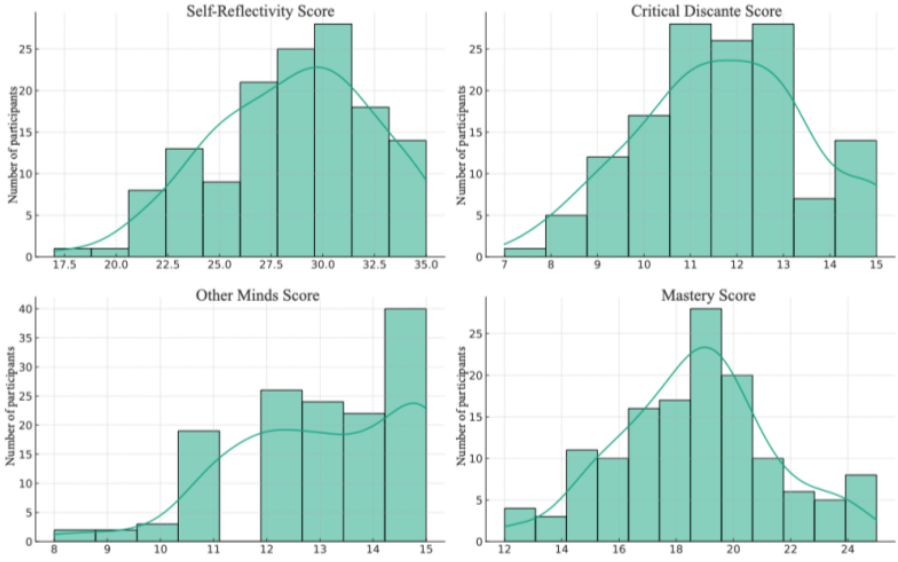
In Table 4, ω coefficients were found to be consistently reliable across all subscales. The "Other Minds" subscale demonstrated the highest reliability with a ω of .68. Conversely, the "Critical Distance" subscale showed the lowest reliability, with a ω of .55. This varying level of reliability across the MSAS subscales calls for further investigation into the constructs it aims to measure. Our results suggest that ω is a suitable alternative to traditional measures such as Cronbach's α for reliability assessment.

Relation to External Criteria

Our analysis explored the convergent validity between the MSAS and TAS-20, two measures theoretically related but methodologically distinct. The TAS-20 assesses "lack of metacognitive abilities" among other traits associated with alexithymia. Thus, it was hypothesized that low scores on metacognitive abilities (MSAS) would correlate with high scores on alexithymia (TAS-20).

From the correlation matrix (see Figure 3), MSAS Self-Reflectivity demonstrated moderate to strong negative correlations with TAS-20 factors, ranging from -.37 to -.47. This was particularly notable with TAS Factor I and TAS Factor II, which focus on difficulties in identifying and describing feelings, respectively. Further multivariate exploration through multiple regression analyses (see Table 5) substantiated these findings, revealing significant associations between TAS Factor I and TAS Factor II with the MSAS Self-Reflectivity subscale.

Figure 1
Histograms Representing the Distribution of the Scores of the Subscales of the MSAS



Note. The x-axis reflects the raw scores of each subscale of the MSAS.

Figure 2
Confirmatory Factor Analysis of the Spanish Version of the MSAS in a Sample of 138 Adults

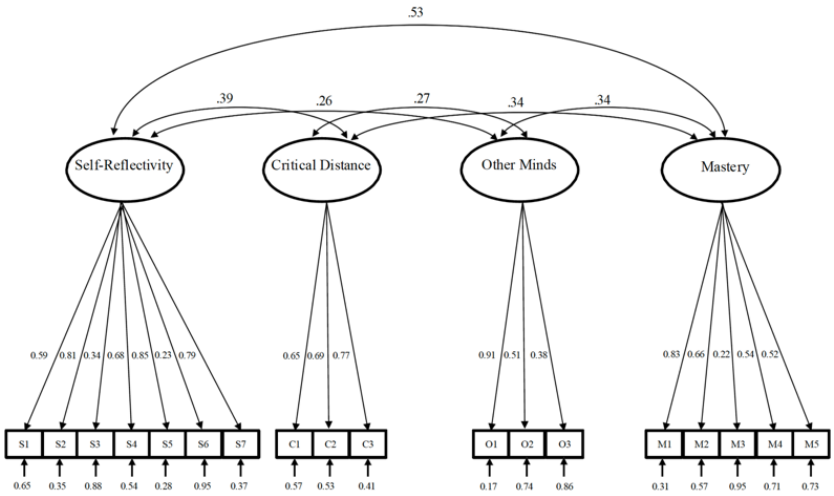


Table 3
Confirmatory Factor Analysis (CFA) of the MSAS

Model	Estimated parameters	χ2	RMSEA	CFI	TLI	AIC	BIC	χ2 diff (*df*)
Four-factor	46	211.27	.07	.89	.86	5,313.84	5,436.79	
Three-factor (A)	42	254.88	.08	.83	.8	5,351.46	5,465.62	47.27 (3)
Three-factor (B)	42	285.78	.09	.79	.75	5,382.36	5,496.52	67.77 (3)
Two-factor	39	328.68	.1	.73	.69	5,421.26	5,529.56	116.45 (5)
One-factor	37	395.02	.12	.64	.59	5,485.6	5,590.98	127.41 (6)

Note. Four-factor model: Self-Reflectivity, Critical Distance, Understanding Other Minds, Mastery; Three-factor model A: Self-Reflectivity, Critical Distance, Mastery; Three-factor model B: Self-Reflectivity, Understanding.

Figure 3
Correlation Matrix of the MSAS Subscales and TAS-20 Factors

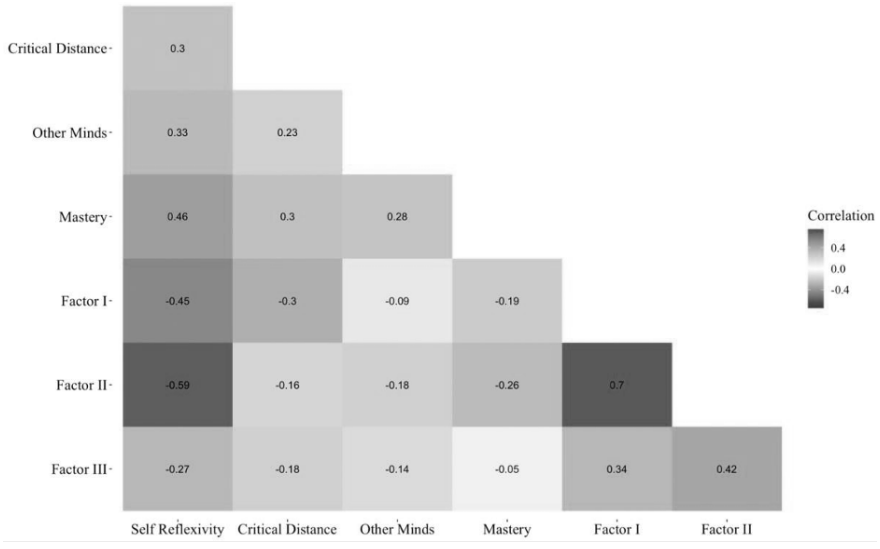


Table 4
Correlations and Reliabilities for MSAS Subscales

	(1)	(2)	(3)	(4)	Cronbach's alpha	McDonald's ω
1. Self-Reflectivity	1				.8	.87
2. Critical Distance	.3	1			.74	.75
3. Understanding Other Minds	.33	.23	1		.6	.66
4. Mastery	.46	.3	.28	1	.67	.76

These results align with the Pearson correlation coefficient of -.48 between the overall scores of MSAS and TAS-20, indicating a significant inverse correlation with a medium (but close to large) effect size. This supports the notion that individuals with high metacognitive abilities exhibit low levels of alexithymia, and vice versa.

These findings confirm our initial hypothesis and provide robust evidence for the convergent validity between MSAS and TAS-20. Individuals with elevated levels of alexithymia tended to score low on metacognitive abilities and demonstrated consistent patterns across distinct facets as assessed by the MSAS subscales.

Discussion

The primary objective of this study was to adapt the MSAS for application in Spanish-speaking communities. In accordance with the modular approach to metacognition, the MSAS was successfully adapted and validated. Our research contributes to the existing body of literature on metacognition by proving an important novel instrument. This newly validated tool broadens the scope for psychological interventions within Spanish speaking populations.

In the present study, the internal consistency metrics for the MSAS closely aligned with those found in both the original version and the Portuguese adaptation of the instrument. Additionally, the CFA affirmed the original four-factor structure of the MSAS, with all fit indices meeting the anticipated criteria (Faustino et al., 2021; Pedone et al., 2017). These results support the modular metacognition theory articulated by Semerari and colleagues (2003). According to this theory, metacognition is not a singular, unified construct but encompasses a range of interconnected cognitive abilities (see also Lysaker et al., 2011). This modular framework may explain the observed variations in internal consistency across the different subscales of the MSAS, suggesting that individuals may display intrasubject differences in their responses to items that assess simple versus complex cognitive abilities.

The study found moderate to strong negative correlations between our version of the MSAS and the TAS-20. This result is particularly noteworthy as it establishes the convergent validity of the MSAS and supports the predicted relationship between high levels of alexithymia and low metacognitive capacities (and vice versa). As indicated by the TAS-20, alexithymia is characterized by difficulties in identifying and describing emotions and by an externally oriented thinking style (Alkan Härtwig et al., 2014). These attributes stand in conceptual opposition to the metacognitive abilities assessed by the MSAS, which include self-reflectivity and emotional awareness. Our findings align with the modular theory of metacognition, suggesting that the ability to reflect on one's mental state is a foundational skill that influences other cognitive and emotional processes.

The strong negative correlation between MSAS and TAS-20 has noteworthy clinical implications. Specifically, it implies that interventions aimed at enhancing metacognitive abilities could potentially alleviate traits associated with alexithymia. This holds particular relevance for therapeutic strategies focused on augmenting emotional awareness and self-reflectivity to enhance overall psychological well-being (Semerari et al., 2003). Several authors (Dimaggio et al., 2007; Semerari et al., 2002; 2014) suggest the relevance of targeting specific metacognitive functions for a successful psychotherapeutic process with patients with personality disorders. Similar claims have been made for patients with psychosis (Lysaker et al., 2011), and even for those with physical illness presenting anxiety and depression (Capobianco et al., 2020).

Limitations

Our study presents several limitations that warrant consideration. First, the sample is relatively small, and half of it compromises university students obtained through accidental sampling, thus limiting the generalizability of our findings to broader and more diverse populations. Secondly, relying on the MSAS as a self-report tool may inadvertently measure participants' self-evaluation capacity rather than their actual metacognitive abilities (Hausberg et al., 2012). Additionally, the absence of clinical populations in our sample restricts the applicability of our findings to individuals with

Table 5
Multiple Regressions Between the MSAS subscales and the TAS-20 Factors

	Self-reflexivity			Critical Distance			Other Minds			Mastery		
Predictors	Estimates	CI	*p*	Estimates	CI	*p*	Estimates	CI	*p*	Estimates	CI	*p*
(Intercept)	5.54	5 – 6.07	**.0***	4.73	4.07 – 5.4	**.0***	4.99	4.37 – 5.61	**.0***	4.26	3.66 – 4.86	**.0***
Factor I	-.19	-.34 – -.04	**.01***	-.25	-.44 – -.07	**.01***	.02	-.15 – .19	.82	-.06	-.22 – .11	.48
Factor II	-.23	-.4 – - .06	**.01***	.21	.0 – .42	**.05***	-.18	-.38 – .01	.07	-.1	-.29 – .09	.3
Factor III	-.09	-.3 – .11	.37	-.22	-.48 – .04	.1	-.06	-.3 – .18	.63	-.03	-.26 – .2	.79
R^2	.27			.01			.05			.04		

Note. *$p < .05$.

psychological disorders where metacognition plays a significant role (Wright et al., 2024). Moreover, the varying levels of reliability across different MSAS subscales suggest that further refinement of the tool may be necessary.

Future Directions

To address these limitations, future endeavors should adopt several strategies. First, a more diverse sample, encompassing different age groups and clinical diagnoses, should be considered to enhance the generalizability of the findings. Second, a multi-method approach, incorporating interviews and behavioral observations alongside the MSAS, could be employed to overcome the limitations of self-reporting. Studies should also prioritize the validation of the MSAS in clinical populations with various diagnoses and treatments to expand its applicability. Additionally, considering the variability in reliability across MSAS subscales, future work should focus on refining the instrument, potentially employing item and confirmatory factor analysis to enhance its psychometric properties. Subsequent research can offer a more comprehensive understanding of metacognition and its assessment through the MSAS by addressing these limitations and incorporating these future directions.

Conclusion

The present study supports the validity of the Spanish adaptation of the MSAS, affirming its conceptually derived original four-factor structure and demonstrating strong internal consistency. Additionally, convergent validity was established through its correlation with the TAS-20, thereby reinforcing the theoretical foundations of a modular approach to metacognition (Flavell, 1979).

The findings significantly contribute to the existing literature on metacognition and introduce new possibilities for psychological interventions within Spanish-speaking communities. The observed strong negative correlation between MSAS and TAS-20 scores carries substantial clinical implications, suggesting that interventions aimed at enhancing metacognitive abilities could be a viable strategy for mitigating traits of alexithymia (Taylor et al., 1997).

Subsequent research should address the aforementioned limitations by incorporating a more diverse sample and utilizing multi-method assessments. Further refinement of the MSAS, especially addressing its varying reliability levels across different subscales, is also merited.

In summary, the successful adaptation and validation of the MSAS for Spanish-speaking populations marks a notable progression in metacognitive research. The provision of a robust and culturally sensitive assessment tool lays the groundwork for a more comprehensive and nuanced understanding of metacognition and its role in mental health (Moritz & Lysaker, 2018).

Financing

The co-author GF has received funding from the Department of Research and Universities of the *Generalitat de Catalunya* through the project with reference SGR-Cat 2021 – 00666. Funders do not have any role in the development of the manuscript and only authors are responsible for the content and writing of this study.

Authors Contribution

All authors meet the criteria recommended by the International Committee of Medical Journal Editors, ICMJE. MAS contributed on Design, Data collection, Supervision, Analysis, Literature Review, Writing and Critical Review; DM contributed on Analysis, Literature Review, Writing and Critical Review; ACF contributed on Design, Data Collection and Writing; and GF contributed on Conception, Design, Supervision, Writing and Critical Review.

Disclosure Statement

Authors declare no conflicts of interest to disclose.

Corresponding Author

The corresponding author for this manuscript will be Danielle Mullins, MSc, assuming the responsibility for keeping co-authors informed of progress through the editorial review process and any of the reviews.

References

Alkan, E., Crayen, C., Heuser, I., & Eid, M. (2014). It's in the mix: Psychological distress differs between combinations of alexithymic facets. *Frontiers in Psychology*, *5*, 1259. https://doi.org/10.3389/fpsyg.2014.01259

Capobianco, L., Faija, C., Husain, Z., & Wells, A. (2020). Metacognitive beliefs and their relationship with anxiety and depression in physical illnesses: A systematic review. *PloS One*, *15*(9), e0238457–e0238457. https://doi.org/10.1371/journal.pone.0238457

Carcione, A., Dimaggio, G., Fiore, D., Nicolò, G., Procacci, M., Semerari, A., & Pedone, R. (2008). An intensive case analysis of client metacognition in a good-outcome psychotherapy: Lisa's case. *Psychotherapy Research*, *18*(6), 667–676. https://doi.org/10.1080/10503300802220132

Dimaggio, G., Semerari, A., Carcione, A., Nicolò, N., & Procacci, M. (2007). *Psychotherapy of personality disorders: metacognition, states of mind and interpersonal cycles*. Routledge. https://doi.org/10.4324/9780203939536

Efklides, A. (2008). Metacognition. *European Psychologist*, *13*(4), 277–287. https://doi.org/10.1027/1016-9040.13.4.277

Elbyaly, M. Y. H., & Elfeky, A. I. M. (2022). The role of metacognition in promoting deep learning in MOOCs during COVID-19 pandemic. *PeerJ Computer Science*, *8*, e945. https://doi.org/10.7717/peerj-cs.945

Erkut, S. (2010). Developing multiple language versions of instruments for intercultural research. *Child Development Perspectives*, *4*(1), 19–24. https://doi.org/10.1111/j.1750-8606.2009.00111.x

Faustino, B., Vasco, A. B., Oliveira, J., Lopes, P., & Fonseca, I. (2021). Metacognitive Self-Assessment Scale: Psychometric properties and clinical implications. *Applied Neuropsychology: Adult*, *28*(5), 596-606. https://doi.org/10.1080/23279095.2019.1671843

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive– developmental inquiry. *American Psychologist*, *34*(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

Hausberg, M. C., Schulz, H., Piegler, T., Happach, C. G., Klöpper, M., Brütt, A. L., Sammet, I., & Andreas, S. (2012). Is a self-rated instrument appropriate to assess mentalization in patients with mental disorders? Development and first validation of the mentalization questionnaire

(MZQ). *Psychotherapy Research: Journal of the Society for Psychotherapy Research*, *22*(6), 699–709. https://doi.org/10.1080/10503307.2012.709325

Kelly, G. A. (1991). *The Psychology of Personal Constructs. Vol. 1. A theory of personality. Vol. 2. Clinical diagnosis and psychotherapy.* Norton. (Original work published in 1955)

Lysaker, P. H., Buck, K. D., Carcione, A., Procacci, M., Salvatore, G., Nicolò, G., & Dimaggio, G. (2011). Addressing metacognitive capacity for self reflection in the psychotherapy for schizophrenia: A conceptual model of the key tasks and processes. *Psychology and Psychotherapy*, *84*(1), 58-69. https://doi.org/10.1348/147608310X520436

Martínez, F. (1996). Adaptación española de la escala de alexitimia de Toronto (TAS-20). [The Spanish version of the Toronto Alexithymia Scale (TAS-20)]. *Clínica y Salud, 7*(1), 19. https://www.proquest.com/scholarly-journals/adaptación-española-de-la-escala-alexitimia/docview/2478599499/se-2

Moritz, S., & Lysaker, P. H. (2018). Metacognition–what did James H. Flavell really say and the implications for the conceptualization and design of metacognitive interventions. *Schizophrenia Research*, *201*, 20–26. https://doi.org/10.1016/j.schres.2018.06.001

Muir, R. A., Howard, S. J., & Kervin, L. (2023). Interventions and approaches targeting early self-regulation or executive functioning in preschools: a systematic review. *Educational Psychology Review, 35*(1), 27. https://doi.org/10.1007/s10648-023-09740-6

Pedone, R., Semerari, A., Riccardi, I., Procacci, M., Nicolò, G., & Carcione, A. (2017). Development of a self-report measure of metacognition: The Metacognition Self-Assessment Scale (MSAS). Instrument description and factor structure. *Clinical Neuropsychiatry: Journal of Treatment Evaluation*, *14*(3), 185–194. Retrieved from https://psycnet.apa.org/record/2017-31745-001

Pellecchia, G., Moroni, F., Carcione, A., Colle, L., Dimaggio, G., Nicolo, G., Pedone, R., Procacci, M., & Semerari, A. (2015). Metacognition assessment interview: instrument description and factor structure. *Clinical Neuropsychiatry*, *12*(6), 157–165. https://iris.unito.it/bitstream/2318/1631381/2/COLLE2015Metacognition.pdf

Revelle, W. (2023). *psych: Procedures for Psychological, Psychometric, and Personality Research* (2.3.3) [Computer software]. https://CRAN.R-project.org/package=psych

Semerari, A., Carcione, A., Dimaggio, G., Falcone, M., Nicolò, G., Procacci, M., y Alleva, G. (2003). How to evaluate metacognitive functioning in psychotherapy? The metacognition assessment scale and its applications. *Clinical Psychology & Psychotherapy*, *10*(4), 238–261. https://doi.org/10.1002/cpp.362

Semerari, A., Carcione, A., Dimaggio, G. G., Falcone, M., Nicolò, G., Pontalti, I., & Procacci, M. (2002). Variation of the Metacognitive Functions within a Psychotherapy of Personality Disorder. In T. Scrimali & L. Grimaldi (Eds.), *Cognitive Psychotherapy Toward a New Millennium: Scientific Foundations and Clinical Practice* (pp. 373–376). Springer. https://doi.org/10.1007/978-1-4615-0567-9_65

Semerari, A., Cucchi, M., Dimaggio, G., Cavadini, D., Carcione, A., Battelli, V., Nicolò, G., Pedone, R., Siccardi, T., D'Angerio, S., Ronchi, P., Maffei, C., & Smeraldi, E. (2012). The development of the Metacognition Assessment Interview: Instrument description, factor structure and reliability in a non-clinical sample. Psychiatry Research, 200(2), 890–895. https://doi.org/10.1016/j.psychres.2012.07.015

Semerari, A., Colle, L., Pellecchia, G., Buccione, I., Carcione, A., Dimaggio, G., Nicolò, G., Procacci, M, & Pedone, R. (2014). Metacognitive dysfunctions in personality disorders: correlations with disorder severity and personality styles. *Journal of Personality Disorders, 28*(6), 751–766. https://doi.org/10.1521/pedi_2014_28_137

Taylor, G. J., Bagby, R. M., & Parker, J. D. A. (1997). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness.* Cambridge University Press. https://doi.org/10.1017/CBO9780511526831

Taylor, G. J., Bagby, R. M., & Parker, J. D. A. (2003). The 20-Item Toronto Alexithymia Scale: IV. Reliability and factorial validity in different languages and cultures. *Journal of Psychosomatic Research*, *55*(3), 277–283. https://doi.org/10.1016/S0022- 3999(02)00601-3

Triandis, H. C. (1980). *Handbook of cross-cultural psychology.* Allyn and Bacon.

Viladrich, C., Angulo-Brunet, A., & Doval, E. (2017). A journey around alpha and omega to estimate internal consistency reliability. *Anales de Psicología*, *33*(3), 755. https://doi.org/10.6018/analesps.33.3.268401

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy*. John Wiley & Sons. https://doi.org/10.1046/m.1365-2850.2002.00006.x

Wells, A., & Matthews, G. (1994). *Attention and Emotion: A Clinical Perspective* (pp. xiii, 402). Lawrence Erlbaum Associates.

Wright, A. C., Palmer-Cooper, E., Cella, M., McGuire, N., Montagnese, M., Dlugunovych, V., Joshua Liu, C-W., Wykes, T., & Cather, C. (2024). Experiencing hallucinations in daily life: The role of metacognition. *Schizophrenia Research*. S0920-9964(22)004704. https://doi.org/10.1016/j.schres.2022.12.023