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Abstract

The purpose of this study was to provide evidence of validity for the Mindful Attention Awareness Scale scores in an Argentine sample (Spanish-language version). Results indicated satisfactory psychometric properties (a one-factor structure, good item discrimination, high reliability, and significant correlations with additional measures). This version could be useful for research and assessment ends.

Keywords

mindfulness, psychological assessment, MAAS, validation, scale

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is one of the most popular measures of mindfulness (Carlson & Brown, 2005; MacKillop & Anderson, 2007; Van Dam, Earleywine, & Borders, 2010). Mindfulness refers to the process of being attentive to and aware of events and experiences occurring in the present (Kabat-Zinn, 1994). The MAAS assesses individual differences in the frequency of mindful states over time. It is focused on the presence or absence of attention to and awareness of what is occurring at present rather than on attributes such as acceptance, trust, empathy, gratitude, or various others that have been associated with mindfulness (e.g., Baer, Smith, & Allen, 2004). In its initial validation study (Brown & Ryan, 2003), the MAAS was tested through a series of measures that indicated good psychometric properties. The MAAS proved to be a unidimensional measure with high internal consistency, with items that had adequate discrimination values and high factor loadings in the first factor. Evidence of external validity was also found. For example, the MAAS was significantly and positively correlated with measures of self-awareness and psychological well-being, and negatively correlated with measures of neuroticism, rumination, and social anxiety. Later studies provided further evidence of validity for the MAAS (Brown, West, Loverich, & Biegel, 2011; Carlson & Brown, 2005; MacKillop & Anderson, 2007).

The scale has been adapted and validated in different countries and cultures, including France (Jermann et al., 2009), Germany (Michalak, Heidenreich, Ströhle, & Nachtigall, 2008), Holland (Schroevers, Nyklicek, & Topman, 2008), Sweden (Hansen, Lundh, Homman, & Wangby-Lundh, 2009), and more

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recently, Turkey (Catak, 2012) and China (Deng et al., 2012). It has also been adapted for use with adolescents (Brown et al., 2011; de Bruin, Zijlstra, de Weijer-Bergsma, & Bögels, 2011) and psychiatric patients (Jermann et al., 2009). To the best of our knowledge, there is only one previous study in the Spanish language; it was conducted in Spain and reported good psychometric properties for the MAAS (Soler et al., 2012). Another version of the MAAS in Spanish was used in a study on psychological variables related to driver inattention (Ledesma, Montes, Poó, & López-Ramón, 2010), but in this case the MAAS was used as only one of many complementary measures, and neither its psychometric properties nor its relation to other psychological variables were reported. Although a study on a Spanish-language version of the MAAS developed in Spain already exists (Soler et al., 2012), the significant contextual, cultural, and linguistic differences between Spanish-speaking countries justifies the need for studies on Latin American populations. In fact, a review of the content of the Spanish-language MAAS revealed the need for revisions and changes to achieve greater validity in our environment.

Given the need for a study in our cultural context, the aim of this study was to evaluate the psychometric properties of a Spanish-language version of the MAAS as applied to an Argentine population. As part of our study, we analyzed the MAAS's internal properties (internal consistency and factorial structure) and provide evidence of external validity. The latter entails analysis in relation to the following alternative measures: the Attention-Related Cognitive Errors Scale (ARCES; Cheyne, Carriere, & Smilek, 2006), the Memory Failures Scale (MFS; Cheyne et al., 2006), the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986), and the Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986). Because the MAAS is a measure of attention and awareness, we expect it to correlate negatively with measures of attention lapses and memory failures, such as the ARCES and MFS. And because boredom proneness is basically the inability to sustain attention and interest on a given object (Cheyne et al., 2006), we expect the MAAS to correlate negatively with the BPS and its two factors, External Stimulation (BPS-Ext) and Internal Stimulation (BPS-Int); the former refers to the need for variety and change, whereas the latter refers to a perceived inability to generate enough stimulation for oneself. It should be mentioned that a previous study found negative and moderate correlations between the MAAS, the ARCES, the MFS, and the BPS (Cheyne et al., 2006). Last, considering that the DES and its three subscales (absorption and imaginative involvement, dissociative amnesia, and depersonalization and derealization experiences) measure dissociative experiences, we expect them to correlate negatively with the MAAS scores.

Method

Participants

A nonprobabilistic sample of 367 adults drawn from the general population of the city of Mar del Plata (Argentina) participated in our study. They all responded to the MAAS, and a subsample of $n = 295$ also responded to the validation measures. Data were collected over a 6-month period. The age of the subjects ranged from 17 to 79 years ($M = 37.30$; $SD = 13.55$) and women accounted for 50.7% of the sample. The educational level of most participants (84%) was at least high school.

Variables and Measures

Mindful Attention Awareness Scale (Brown & Ryan, 2003). This scale is the subject of the present study's analysis. It is a self-reporting questionnaire composed of 15 items that evaluate attentional lapses (e.g., "I find it difficult to stay focused on what's happening in the present"). First, the research team translated the original English-language version of the MAAS into Spanish. Then, an expert translated the Spanish version back into English for the purpose of assuring that each item's meaning was preserved. A pilot test revealed that the original 6-point response scale (1 = *almost*

always, 2 = *very frequently*, 3 = *somewhat frequently*, 4 = *somewhat infrequently*, 5 = *very infrequently*, and 6 = *almost never*; Brown & Ryan, 2003) was difficult to translate and struck pilot-takers as unusual. As a result, we found it more practical to change the response scale from the original 6 points to a 5-point format (with 1 indicating *always or almost always* and 5 indicating *never or almost never*), which proved more familiar and easier for Argentine respondents to use. The DES and BPS scales posed the same issue, and the response scales for both of them were also modified for this and prior studies (see, e.g., Ledesma et al., 2010; Montes, Ledesma, & Poó, 2011).

An additional minor change was made to Item 12 ("I drive places on 'automatic pilot' and then wonder why I went there"). Our translation seeks to expand the scope of the question so as to encompass the entire population, even those who do not drive. For this reason, Item 12 was translated as follows: "I go someplace and then wonder why I went there." It is worth noting that the Swedish version of the MAAS made the same modification to this item (Hansen et al., 2009).

Attention-Related Cognitive Errors Scale (Cheyne et al., 2006). This is a 12-item questionnaire describing everyday performance failures arising directly or primarily from brief failures of sustained attention. For example, one item reads: "I have absent-mindedly placed things in unintended locations (e.g., putting milk in the pantry or sugar in the fridge)." We employed a 5-point Likert-type scale ranging from 1 = *never* to 5 = *very often*, with higher scores indicating a greater number of errors. In the current sample, the scale had a Cronbach's alpha of .89.

Memory Failures Scale (Cheyne et al., 2006). The MFS includes 12 items tied to situations involving memory failures (e.g., "Even though I put things in a special place, I still forget where they are"). The MFS uses a Likert-type scale ranging from 1 = *almost never* to 5 = *almost always*. In the present study, Cronbach's alpha was .86.

Dissociative Experiences Scale (Bernstein & Putnam, 1986). This 28-item self-report instrument measures the frequency with which different types of dissociative experiences take place. In this study, items were answered on a 5-point scale ranging from 1 = *never or almost never* to 5 = *always or almost always*. The scale has three factors or subscales: absorption and imaginative involvement (DES.Abs; Cronbach's $\alpha = .82$), dissociative amnesia (DES.Amn; Cronbach's $\alpha = .65$), and depersonalization and derealization experiences (DES.De; Cronbach's $\alpha = .71$). Cronbach's alpha for the overall scale was .87.

Boredom Proneness Scale (Farmer & Sundberg, 1986). This measure was designed to assess a person's proneness for boredom. It consists of 28 items (e.g., "It takes a lot of change and variety to keep me really happy," "Having to look at someone's home movies or travel slides bores me tremendously"). Cronbach's alpha was .77 for the External Stimulation scale and .76 for the Internal Stimulation scale. In both scales, a higher score indicates a greater propensity for boredom. In this study, items were answered on a 5-point scale, ranging from 1 = *never or almost never* to 5 = *always or almost always*.

Procedure

Participants were recruited by researchers and psychology students serving as surveyors and assisting with data collection, who first screened participants to ensure that they fulfilled the sample's inclusion criteria. Participation in the study was entirely voluntary and without financial incentive. Participants were given a guarantee that their data would remain anonymous and confidential. In the process of obtaining informed consent, researchers explained to participants the objectives of the study and the aforementioned conditions and characteristics. Participants were then asked to complete the instruments on their own. The instruments were administered at the facilities of the National University of Mar del Plata, Psychology Department, and, on occasion, at the participant's home. In all cases, the evaluator

was present while the participant completed the questionnaires. On average, the questionnaires were completed in 15 minutes. The response rate was very high (>95%; actual participants vs. potential participants contacted). There were very few instances of missing data. We applied a pairwise deletion in the case of correlation analysis and the estimation-maximization (EM) algorithm of Imputation prior to the confirmatory factor analysis (CFA). In a subsample of $n = 295$, the MAAS was applied along with the ARCES, the MFS, the DES, and the BPS. In this case, questionnaires were completed in 15 minutes on average.

The following statistical analyses were performed: (a) CFA, (b) reliability and item analysis, (c) *t* test to examine differences in MAAS scores due to gender, and (d) correlation analysis between the MAAS, the age, and the validation measures. The computer programs AMOS 16 and SPSS were used.

Table 1. Confirmatory Factor Analysis Estimates and Fit Indices for the One-Factor Model.

Item	Loading
Item 1	.40
Item 2	.35
Item 3	.50
Item 4	.59
Item 5	.44
Item 6	.44
Item 7	.59
Item 8	.60
Item 9	.60
Item 10	.62
Item 11	.30
Item 12	.51
Item 13	.55
Item 14	.67
Item 15	.58

Note. Model fit indices: $\chi^2 = 259.815$ ($df = 90$, $p < .001$); $\chi^2/df = 2.88$; goodness-of-fit index = .91; adjusted goodness-of-fit index = .88; comparative fit index = .89; incremental fit index = .89; root mean square error of approximation = .072.

Results

Confirmatory Factor Analysis

As is usual in CFA, we evaluated parameter estimates in relation to model predictions and assessed the goodness-of-fit for the one-factor model. Model parameters were estimated using the maximum-likelihood method. The following fit indices were chosen to assess the goodness of fit: chi-square and relative chi-square (chi square/degree of freedom ratio), GFI (goodness-of-fit index), AGFI (adjusted goodness-of-fit index), RMSEA (root mean square error of approximation), CFI (comparative fit index), and IFI (incremental fit index). Overall, the one-factor model fits the data well, and all items had positive loadings in the first factor (see Table 1). A brief analysis of the fit-indices compared with the results of previous studies follows (see Table 2).

The chi-square statistic measures the discrepancy between the observed and expected covariance matrices. A good model fit would provide a nonsignificant result ($p > .05$). In our case, $\chi^2 = 259.815$ ($df = 90$, $p < .001$). However, the chi-square statistic is sensitive to sample size. An alternative measure of model fit is provided by the relative/normed chi-square, which is the chi-square divided by degrees of freedom (χ^2/df). A problem with this index is that there is no consensus regarding acceptable values. In our case, $\chi^2/df = 2.88$, which lies between 2 and 3, as in previous MAAS studies (Brown & Ryan, 2003; Deng et al., 2012).

The GFI is an index based on the percentage of explained variance. It estimates how closely the model is capable of replicating the observed covariance matrix. Because of some problems with the GFI, the use of a modified version (AGFI) is recommended. Both statistics range from 0 to 1 (recommended cut-off point = .90). Although these measures are questionable, we decided to include them for the sake of comparison with the Soler study, which reports values of GFI = .88 and AGFI = .84. In our study, the values were somewhat higher: GFI = .91 and AGFI = .88. The GFI is above the recommended level and the AGFI is slightly below.

Table 2. Comparison of Fit Indices With Results From Previous Studies.

		Brown and Ryan (2003)				
	Present Study	Student Sample	General Adult Sample	Mackillop and Anderson (2007)	Soler et al. (2012)	Deng et al. (2012)
Chi-square (*df*)	259.815 (90); $p < .001$	189.57 (90); $p < .001$	179.14 (90); $p < .001$	—	229.390; $p < .001$	—
Relative chi-square	2.88	2.11	—	—	—	2.69
GFI	0.91	0.92	0.91	—	0.88	—
AGFI	0.88	—	—	—	0.84	—
CFI	0.89	0.91	0.92	0.91	0.92	0.94
IFI	0.89	—	0.92	—	—	—

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; CFI = comparative fit index; IFI = incremental fit index.

The RMSEA is one the most popular and recommended indices of model fit. It ranges from 0 to 1, with lower values indicating a better model fit. We obtained an RMSEA score of .072 (confidence interval = .062–.082), indicating an acceptable fit similar to those obtained in prior studies.

Finally, CFI and IFI are both comparative fit indices. They measure the extent to which the model is better than the independence or null model. Values that approach 1 indicate acceptable fit. We obtained a CFI = IFI = .89. These values are just below the minimal acceptance threshold (.90) and are close to the values reported in previous studies.

Last, the dimensionality of the MAAS was also assessed via a Parallel Analysis (PA) test, a method for determining the number of "significant" first-order factors underlying a correlation matrix (Ledesma & Valero-Mora, 2007). PA estimates cut-off scores for factor eigenvalues by using a Monte Carlo simulation. In our case, the result indicates that only the first factor has an eigenvalue that surpasses the estimated cut-off threshold, which provides evidence for the one-factor solution. The appendix lists the full output of the PA.

Item Analysis and Internal Consistency

Descriptive statistics for items are shown in Table 3. Corrected item–total correlations ranged from moderate to high, indicating that items have good discrimination (see Table 3). The internal consistency of MAAS scores was high (Cronbach's $\alpha = .87$).

Gender and Age Differences

Significant differences were detected between women, $M = 57.03$ ($SD = 9.90$), and men, $M = 59.65$ ($SD = 9.16$), $t(359) = -2.60$, $p < .01$. However, the effect size was low, Cohen's $d = -.27$, $r = -.13$. A correlation analysis between age and the MAAS indicated a positive, albeit weak, relationship, $r = .17$, $p < .01$.

Construct Validity

The MAAS correlated consistently and significantly with all the additional measures (see Table 4). The correlation was negative and moderate with the ARCES and the MFS. Negative and moderate correlations were also found with the DES and its three subscales: DES-Abs, DES-Amn, and DES-De. The correlations between the MAAS and both BPS scales were also negative, although less pronounced.

Discussion

In recent years, there have been various validation studies on the MAAS, one of the most commonly used mindfulness questionnaires (Brown & Ryan, 2003; Carlson & Brown, 2005; Cheyne et al., 2006; MacKillop & Anderson, 2007). However, there do not exist systematic studies with Latin American populations that

Table 3. Item Properties for Mindful Attention Awareness Scale (Means, Standard Deviations, and Discrimination).

Item	*M* (*SD*)	Item Discrimination
1. I could be experiencing some emotion and not be conscious of it until some time later. (Sentir o tener emociones—alegría, angustia, etc.—sin ser muy conciente de esos sentimientos en el momento en que me suceden.)	4.11 (1.02)	.38
2. I break or spill things because of carelessness, not paying attention, or thinking of something else. (Romper o dejar caer objetos por descuido o por no prestar atención.)	4.19 (0.92)	.37
3. I find it difficult to stay focused on what's happening in the present. (Tener dificultad para focalizarme o prestar atención a lo que está sucediendo en el presente.)	4.20 (0.93)	.52
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way. (Caminar rápido para llegar a un lugar, sin prestar atención a lo que me va pasando en el camino.)	3.71 (1.17)	.58
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention. (No darme cuenta que estoy incómodo o tenso, hasta que estas sensaciones se vuelven muy intensas.)	4.04 (1.01)	.38
6. I forget a person's name almost as soon as I've been told it for the first time. (Olvidar el nombre de una persona casi inmediatamente después de que me lo han dicho.)	3.55 (1.23)	.45
7. It seems I am "running on automatic" without much awareness of what I'm doing. (Puedo funcionar en 'piloto automático', sin darme mucha cuenta de lo que estoy haciendo.)	4.01 (1.00)	.62
8. I rush through activities without being really attentive to them. (Puedo pasar de una cosa a otra prácticamente sin darme cuenta.)	3.86 (1.05)	.61
9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there. (Focalizo tanto en mis objetivos que no soy conciente de lo que voy haciendo en el proceso.)	4.12 (0.97)	.60
10. I do jobs or tasks automatically, without being aware of what I'm doing. (Hago trabajos y tareas automáticamente, sin prestar atención a lo que estoy haciendo.)	4.02 (1.06)	.65
11. I find myself listening to someone with one ear, doing something else at the same time. (Puedo escuchar a alguien con un oído y estar haciendo otra cosa al mismo tiempo.)	3.34 (1.28)	.35
12. I go someplace and then wonder why I went there. (Voy hacia un lugar y luego me pregunto para que fui allí.)	3.99 (1.01)	.52
13. I find myself preoccupied with the future or the past. (Me preocupo por el futuro o el pasado, sin estar muy pendiente del presente.)	3.60 (1.20)	.54
14. I find myself doing things without paying attention. (Me doy cuenta de que hago cosas sin prestar atención.)	3.72 (1.08)	.64
15. I snack without being aware that I'm eating. (Puedo comer algo sin prestar atención o sin disfrutar de la comida.)	3.81 (1.16)	.54

Table 4. Correlations Among MAAS and the Additional Measures.

	ARCES	MFS	DES	DES.Abs.	DES.Amn.	DES.De.	BPS.E	BPS.I
MAAS	−.62**	−.73**	−.60**	−.45**	−.59**	−.34**	−.41**	−.14*

Note. MAAS = Mindful Attention Awareness Scale; ARCES = Attention-Related Cognitive Errors Scale; MFS = Memory Failures Scale; DES = Dissociative Experiences Scale (total score); DES.Abs. = DES Absorption subscale; DES.Amn. = DES Amnesia subscale; DES.De. = DES Depersonalization subscale; BPS.E = Boredom Proneness Scale (External Stimulation); BPS.I = Boredom Proneness Scale (Internal Stimulation).
**$p < .01$ (unilateral). *$p < .05$ (unilateral).

indicate it is a valid instrument in our cultural context. This study presents preliminary evidence of the reliability and validity of a Spanish-language version of the MAAS as applied to an Argentine population. Overall, results indicate that the MAAS scores have satisfactory psychometric properties in our cultural context. The CFA suggests the plausibility of the one-factor model. The items show high factor loadings and have good discrimination indices. Also, the measure has good reliability in terms of internal consistency. These psychometric properties are similar to those found in the original study (Brown & Ryan, 2003) and in the other prior studies we identified (Catak, 2012; Deng et al., 2012; MacKillop & Anderson, 2007; Soler et al., 2012).

With regard to age differences, we found a positive but weak correlation between age and the MAAS scores. The previous literature is inconclusive on this point. While some studies suggest a correlation between mindfulness and age (e.g., Hansen et al., 2009), others either do not support that notion or do not report on it (Baer et al., 2004; Brown & Ryan, 2003). Additionally, we also observed a small gender difference (men score higher than women) that had not been reported in previous literature (Brown & Ryan, 2003; Deng et al., 2012; Hansen et al., 2009; MacKillop & Anderson, 2007). Further research is needed to further clarify gender and age differences. It would be important to know if these slight age and gender differences are consistent in our culture or occur because of some specific biases in the present study (e.g., sampling error).

Additionally, we have obtained external evidence of validity by correlating the MAAS with measures that we supposed were theoretically related. We found negative correlations with external indicators of the lack of mindfulness. The MAAS scores showed a strong and negative relationship with measures of attentional errors and memory failures in everyday life (the ARCES and the MFS). It also demonstrated a more moderate association with a measure for boredom propensity (BPS). Both of these results support the findings of Cheyne et al. (2006), who previously reported similar correlations among the MAAS, the ARCES, the MFS, and the BPS. Furthermore, we found the MAAS scores to be negatively associated with measures of dissociative experiences (psychological absorption, amnesia, and depersonalization). These relations refer to normal dissociative experiences (absent-mindedness, absorption, etc.) and also psychopathological phenomenon (depersonalization experiences). These findings are consistent with Baer et al. (2004) and Baer, Smith, Hopkins, Krietemeyer, and Toney (2006), which found inverse relationships between mindfulness and dissociative experiences, although these studies did not address the relationship with dissociative phenomenon of a pathological nature.

In conclusion, this study provides preliminary evidence of reliability and validity for the MAAS scores in the Argentine population. This version could be useful when applied for scientific and assessment ends. Nonetheless, we are aware of the limitations of this study. First, since all of the validity scales are related to lack of attention and awareness, the study could benefit from validation studies that include measures expected to correlate positively with the MAAS (e.g., Five Facets of Mindfulness Questionnaire; Baer et al., 2006). Second, the results of this study are based on a nonprobability sample from a particular place, thus limiting the generalization of the results to other contexts and populations. More evidence

of validity is needed in our context and in other Latin American countries, as well as within specific groups (e.g., clinical populations, adolescents, and older adults). Another consideration is that our study is based on self-reporting techniques that are vulnerable to response biases (e.g., social desirability response bias). It would be valuable to undertake validation studies that include objective measures, such as attention performance measures, to compensate for the shortcomings of self-reporting instruments.

Appendix

Parallel Analysis

Observed Eigenvalues	Estimated Cut-off Eigenvalues
5.485	**1.43759**
1.212	1.33581
1.072	1.26324
0.929	1.20639
0.805	1.14987
0.755	1.10318
0.716	1.06502
0.671	1.02017
0.617	0.98341
0.579	0.94125
0.523	0.90085
0.479	0.86266
0.413	0.82594
0.392	0.7865
0.351	0.73429

Note. Method: Normal data simulation; number of simulated samples = 499; eigenvalues at percentile = 95. Bolding indicates that only the first factor has an eigenvalue that surpasses the estimated cut-off threshold.

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