ARTÍCULO DE INVESTIGACIÓN

PSYCHOMETRIC PROPERTIES OF THE MEXICAN VERSION OF THE MINDFUL ATTENTION AWARENESS SCALE (MAAS)

PROPIEDADES PSICOMÉTRICAS DE LA VERSION MEXICANA DE LA ESCALA DE ATENCIÓN PLENA (MAAS)

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Abstract

This study presents a translation of the Mindful Attention Awareness Scale (MAAS) into Mexican Spanish, and examines its psychometric properties as well as its relationship with socio-demographic variables. The MAAS measures the frequency with which people experience mindful states. A sample of N = 622 healthy adult Mexicans completed the MAAS. A smaller sub-sample (n=195) completed the Five-Facet Mindfulness Questionnaire (FFMQ), a well-known mindfulness measure, to obtain concurrent validity. Exploratory factor analysis (EFA) revealed a one-factor solution, and reliability coefficients were adequate. Confirmatory factor analysis (CFA) showed adequate goodness of fit

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indexes. Moreover, relationships between Mexican Spanish MAAS scores and socio-demographic variables were also explored, and differences between-groups were found in mean scores both in alcohol consumers and religious practitioners. No other significant differences between-groups were found. Results suggest that the Mexican version of the MAAS is a reliable and valid instrument to use with a healthy adult Mexican sample.
Keywords: MAAS, mindfulness, Mexican sample, reliability, validity.

Resumen

Este estudio presenta una traducción de la Mindful Attention Awareness Scale (Escala de Atención Plena) al español mexicano y examina sus propiedades psicométricas, así como su relación con variables sociodemográficas. La Escala de Atención Plena mide la frecuencia con la que las personas experimentan estados de atención plena. Una muestra de N=622 adultos mexicanos sanos completaron la Escala de Atención Plena. Una submuestra más pequeña (n=195) completó el Cuestionario de Cinco Facetas de la Atención Plena, el cual es una escala bien conocida de atención plena, para obtener validez concurrente. El análisis factorial exploratorio reveló una solución unifactorial y los coeficientes de confiabilidad fueron adecuados. El análisis factorial confirmatorio mostró índices adecuados de bondad de ajuste. Además, también se exploraron las relaciones entre la versión Mexicana del MAAS y variables sociodemográficas, encontrándose diferencias entre grupos tanto en consumidores de alcohol como en practicantes de religión. No se encontraron otras diferencias significativas entre grupos. Los resultados sugieren que la versión mexicana de la MAAS es un instrumento confiable y válido para utilizarse con población mexicana adulta y sana.
Palabras clave: escala de atención plena, MAAS, mindfulness, muestra mexicana, confiabilidad, validez

Introduction

Over the last few years, there has been a growing interest in researching mindfulness, whether as a process, outcome or practice in different settings. Several interventions that utilize mindfulness as their main element have been proven successful in the treatment of stress-related and psychosomatic symptoms, such as Mindfulness-Based Stress Reduction (Kabat-Zinn, 1990) and Mindfulness-Based Cognitive Therapy (Teasdale, Segal, & Williams, 1995), both of which use training in mindfulness meditation (as their core element). Other interventions build on mindfulness as a key component without explicitly training individuals in mindfulness meditation, such as Dialectical Behavioral Therapy (Linehan, 1993) and Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999). The construct of mindfulness has been defined in different ways. For instance, mindfulness can be understood in its original context derived from the Buddhist tradition, as a single-minded awareness of inner experience in the successive moments of perception (Nyanaponika Thera, 1972). Similarly, it can be defined as "the moment-by-moment observing of the three characteristics (impermanence, suffering, and not-self) of the meditation object" (Grabovac, Lau, & Willett, 2011). It is important to note that the mindfulness construct ("Sati", in the Pali language) has many other dimensions and definitions besides present moment awareness in its original Buddhist context, such as being one important factor to achieve enlightenment (Goldstein, 2013), etc. which are beyond the scope of this paper. However, efforts have been made to define mindfulness from a non-Buddhist (secular) perspective, and perhaps the most widely known definition is the one by Jon Kabat-Zinn, who affirms that mindfulness is "paying attention to the present moment, on purpose, in a non-judgmental and non-reactive way" (Kabat-Zinn, 1990, p. 2). Even though Kabat-Zinn's conceptualization of mindfulness is frequently cited, there are further definitions that complement and emphasize certain aspects of it. For instance, a definition by Bishop et al. (2004) aims at further clarifying the construct by stating that mindfulness can be understood as having two components: the first one is the self-regulation of attention (attentional component), and the second is a particular orientation towards present-moment experiences (attitudinal component), which includes curiosity, openness and acceptance. The authors suggest that the interaction of both components can predict positive outcomes in different psychological variables. Yet another definition (Shapiro, Carlson, Astin, & Freedman, 2006) affirms that mindfulness has three components: intention, attention, and attitude, as well as a meta-mechanism called "re-perceiving". The three components, according to the authors, are not separate processes but rather a single continuum happening at the same time, and their interaction leads to a significant shift in perspective, namely, re-perceiving, from which four additional mechanisms stem: self-regulation, clarification of values, cognitive, emotional and behavioral flexibility and exposure. This definition has been regarded as a

"second generation" conceptualization of mindfulness (McCown, Reibel, & Micozzi, 2010). It is interesting to note that different schools of thought emphasize certain characteristics of mindfulness more than others (Brown, Ryan, & Creswell, 2007). In that sense, mindfulness is sometimes characterized by only the attentional component and sometimes by both the attentional and the attitudinal components. Regarding the attentional component, mindfulness has been defined as 'receptive attention to and awareness of present events and experience' that varies both within and between individuals; in other words, it is a personality trait (Brown, & Ryan, 2003). Similarly, from the Buddhist perspective mindfulness has also been defined from an attentional point of view as "bare" attention and "pure" awareness (Gunaratana, 2002).

Thus, there is some diversity among the emphasis of certain aspects within the definitions of mindfulness, and consequently several different scales have been created that measure different aspects of the construct. The most widely-used questionnaires are: the Mindful Attention Awareness Scale (MAAS), which is the object of the present study and measures mindfulness from an attentional perspective (Brown, & Ryan, 2003) and will be described in more detail below; the Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), which measures five factors associated with the construct of mindfulness; the Freiburg Mindfulness Inventory (Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006), designed to measure the state of mindfulness after a meditation retreat; the Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004) which measures several facets of mindfulness; the Philadelphia Mindfulness Scale (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008), that measures both mindfulness and acceptance; the Cognitive and Affective Mindfulness Scale-Revised (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2006), designed as a brief, multifaceted measure of mindfulness; and the Toronto Mindfulness Scale (Lau et al., 2006), which measures the state of mindful self-regulation of attention and approach to experience.

The Mindful Attention Awareness Scale (MAAS)

Out of the several psychometric tests that have been developed to measure mindfulness, probably the most widely researched and used nowadays is the MAAS, which assesses individual differences in the frequency of mindful states over time (Brown, & Ryan, 2003). Factor analyses in different populations have revealed that the MAAS has a single-factor structure, and solid internal reliability scores across different populations (Brown, & Ryan, 2003; Carlson, & Brown, 2005; MacKillop, & Anderson, 2007). Evidence suggests that MAAS scores are sensitive to mindfulness training, particularly after MBSR (Dobkin, & Zhao, 2011; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008), as well as to changes in brain activity (Kilpartick et al., 2012; Brown, Goodman, & Inzlicht, 2013).

The MAAS has been validated and translated to several other languages, such as German (Michalak, Heidenreich, Ströhle, & Nachtigall, 2008), Chinese (Deng et al., 2008), Swedish (Hansen, Lundh, Homman, & Wångby-Lundh, 2009), French (Jermann et al., 2009) and Spanish (Araya-Vargas, Gapper-Morrow, Moncada-Jiménez, & Buckworth, 2009; Johnson, Wiebe, & Morera, 2013; Soler et al., 2012).

The adaptation of valid and reliable instruments that measure the construct of mindfulness is important, particularly in countries where mindfulness research is still in its infancy, such as the case of Mexico. To our knowledge, the present study presents the first published validation of any mindfulness scale in a Mexican population. In addition, it is often overlooked that the vast majority of studies measuring mindfulness in different settings have used Caucasian participants, and therefore their ecological validity is not well established yet.

Although there are, to the best of our knowledge, three Spanish-language versions of the MAAS (Araya-Vargas, et al., 2009; Johnson et al., 2013; Soler et al., 2012), no translations or validations are available specifically for the Mexican population. Furthermore, even though the same language may be used, slight but important translation differences from other Spanish versions of the MAAS are necessary to guarantee culturally relevant questionnaire items for the Mexican population in order to address external validity and avoid misinterpretations regarding the meaning of specific items.

It is important to adapt and validate the MAAS to the Mexican population in order to further the advancement of mindfulness research in a culturally relevant way and

to inquire if there are aspects of mindfulness in Mexico that differ from those of Europeans or North Americans.

Therefore, the aim of the present study was to translate the MAAS into Mexican Spanish, in order to assess its reliability in a healthy Mexican adult sample. Furthermore, we assessed its convergent validity by including another frequently used mindfulness questionnaire, the FFMQ. Additionally, the properties of the Mexican version of the MAAS related to several socio-demographic variables of the sample were explored, including gender, age, educational level, sports practice, working status, marital status, number of children, number of siblings, hours dedicated to religion, religion practice, alcohol and cigarette consumption and number of hours watching TV. We hypothesized that levels of mindfulness will be positively associated with religious practice and hours dedicated to religion, and negatively with alcohol and cigarette consumption, as well as hours watching TV, and that there won't be any significant differences in levels of mindfulness in relation with the rest of socio-demographic variables used for the present study. These hypotheses are based on studies showing that trait mindfulness is related negatively with alcohol consumption (Garland, Gaylord, Boettiger, & Howard, 2010) and positively with religiois practice (Carmody, Reed, Kristeller, & Merriam, 2008). Regarding hours watching TV, we assumed that mindfulness would be negatively affected, based on the fact that it is an activity which is usually done in a mindless way (Langer, & Piper, 1988).

Method

Participants

Demographic characteristics of the sample are presented in table 1. The total sample consisted of 622 participants, who completed the MAAS either through an online platform (n=564) or with a paper and pencil version of the questionnaire (n=63). All of the paper and pencil measurements were taken before a Mindfulness-Based Stress Reduction (MBSR) intervention in Mexico City. All participants completed the questionnaires voluntarily and in a single session. None of the participants received any kind of compensation for their participation in the study. There was a small amount of missing data on demographic characteristics which is described in table 1.

Table 1. Demographic characteristics of the sample

	n	%	Mean (SD)
Gender			
Male	221	35.2	
Female	406	64.8	
Education Level			
Primary	21	3.3	
Secondary	56	8.9	
High School	135	21.5	
Bachelors	374	59.6	
Masters/Specialty	38	6.1	
Doctoral	3	0.5	
Practice Sports?			
Yes	304	50.2	
No	301	49.8	
Works?			
Yes	371	59.2	
No	256	40.8	
Marital Status			
Single	331	52.8	
Married	200	31.9	
Divorced/ separated	48	7.7	
Living Together	39	6.2	
Widow/er	9	1.4	
Age	627		34.14 (12.21)
Number of Children	605		0.97 (1.34)
Number of Siblings	605		3.17 (2.31)
Hours dedicated to religion per week	602		1.56 (1.56)
Number of smoked cigarettes per day	599		0.81 (2.62)
Number of alcoholic drinks per month	600		3.79 (8.27)
Number of hours watching TV per week	599		8.26 (7.47)

Procedure

Translation of the MAAS into Mexican Spanish

The original version of the MAAS (Brown, & Ryan, 2003) questionnaire was translated independently to Mexican Spanish by the first (ELM) and the second (MRHP) authors, who are long-term practitioners of mindfulness and Zen meditation respectively, and are fluent in both Spanish and English. Then, both translated versions were crosschecked by ELM and MRHP to ensure that the translation was accurate and reflected the original meaning of the items in English. A final selection of items was obtained after discussing the translations and coming to agreements where wording was not identical between the two translations (see annex 1). We found that our translation had several differences in comparison to the other Spanish versions, which from our perspective were significant in order for the questionnaire to be understandable and relevant for Mexican population. For instance, in item #15 ("I snack without being aware that I'm eating", in the original MAAS) Soler et al. (2012) translate the verb "snack" as "picar", which is a verb not frequently used as a synonym of "snack" in Mexican Spanish, so we decided to use the verb "comer", which literally means "to eat" but is more relevant culturally for Mexican and Latino population in general. Another example is item #13 ("I find myself preoccupied with the future or the past", in the original MAAS). Araya-Vargas, et al. (2009) translated the verb "to preoccupy" as "meditar", which literally means "to meditate" in English, and since meditation practice is closely related to the construct of mindfulness and using the word "meditar" could be a source of confusion for respondents, we concluded that using the verb "preocupar" ("to worry" or "to preoccupy" in English) would reflect the meaning of the original item in a better way. In item #7 ("It seems I am "running on automatic," without much awareness of what I'm doing", in the original MAAS), Soler et al. translate the word "awareness" as "consciencia", which in Mexican and Latino Spanish can have a strong moral meaning not related with the current definitions of mindfulness, therefore we decided to use the term "darse cuenta" which resembles more the intended meaning of mindfulness in terms of paying attention to present moment events. This is particularly evident on item #10 ("I do jobs or tasks automatically, without being aware of what I'm doing" in the original MAAS), in which the Spanish authors translate "awareness" as "darse cuenta", so in their version they actually translate "awareness" in two different ways, which may be a source of confusion and incongruency for respondents. From our perspective, all of the above differences seem to be significant enough to justify the use of a new translation to be used with Mexican and even Latino populations, in order to avoid culturally-related misinterpretations of the items. Table 2 presents the items from the original version, the Spanish (Spain) version and the translation used for the present study (Mexican Spanish).

Table 2. Comparison between Spanish and original versions of the MAAS.

Mexican-Spanish Translation (Present study).	Spanish (Spain) translation (Soler, et al., 2012).	Original version in english (Brown, & Ryan, 2003).
1. Puedo sentir una emoción y no estar consciente de ella hasta tiempo después.	Podría sentir una emoción y no ser consciente de ella hasta más tarde.	I could be experiencing some emotion and not be conscious of it until some time later,
2. Rompo o derramo cosas por descuido, al no poner atención, o porque estoy pensando en otra cosa.	Rompo o derramo cosas por descuido, por no poner atención, o por estar pensando en otra cosa.	I break or spill things because of carelessness, not paying attention, or thinking of something else.

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Mexican-Spanish Translation (Present study).	Spanish (Spain) translation (Soler, et al., 2012).	Original version in english (Brown, & Ryan, 2003).
3. Se me hace difícil permanecer concentrado en lo que está sucediendo en un momento dado.	Encuentro difícil estar centrado en lo que está pasando en el presente.	I find it difficult to stay focused on what's happening in the present.
4. Tiendo a caminar rápidamente para llegar a donde tengo que ir, sin poner mucha atención a lo que ocurre alrededor.	Tiendo a caminar rápido para llegar a dónde voy, sin prestar atención a lo que experimento durante el camino.	I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
5. Tiendo a no percibir la tensión física o el nivel de incomodidad a que estoy sometido, hasta que realmente son evidentes.	Tiendo a no darme cuenta de sensaciones de tensión física o incomodidad, hasta que realmente captan mi atención.	I tend not to notice feeling of physical tension or discomfort until they really grab my attention.
6. Se me olvidan los nombres de las personas, inmediatamente después de que me presentan a alguien.	Me olvido del nombre de una persona tan pronto me lo dicen por primera vez.	I forget a person's name almost as soon as I've been told it for the first time.
7. Parece como si estuviera funcionando de manera «automática» sin darme cuenta de lo que estoy haciendo.	Parece como si «funcionara en automático» sin demasiada consciencia de lo que estoy haciendo.	It seems I am "running on automatic," without much awareness of what I'm doing
8. Me apresuro a hacer mis tareas sin realmente prestarles mucha atención.	Hago las actividades con prisas, sin estar realmente atento a ellas.	I rush through activities without being really attentive to them.
9. Me concentro tanto en la meta que quiero alcanzar, que pierdo contacto con lo que estoy haciendo para conseguirla.	Me concentro tanto en la meta que deseo alcanzar, que pierdo contacto con lo que estoy haciendo ahora para alcanzarla.	I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
10. Realizo trabajos automáticamente, sin ponerle mucha atención a lo que hago.	Hago trabajos o tareas automáticamente, sin darme cuenta de lo que estoy haciendo.	I do jobs or tasks automatically, without being aware of what I'm doing
11. Escucho a mi interlocutor con un oído, mientras hago otra cosa simultáneamente.	Me encuentro a mí mismo escuchando a alguien por una oreja y haciendo otra cosa al mismo tiempo.	I find myself listening to someone with one ear, doing something else at the same time.
12. Llego a un lugar en «piloto automático» y luego me pregunto qué iba a hacer en ese lugar.	Conduzco «en piloto automático» y luego me pregunto por qué fui allí.	I drive places on 'automatic pilot' and then wonder why I went there.
13. Me preocupo por cosas que pueden ocurrir en el futuro o por asuntos del pasado.	Me encuentro absorto acerca del futuro o el pasado.	I find myself preoccupied with the future or the past.
14. Hago cosas sin ponerles mucha atención.	Me descubro haciendo cosas sin prestar atención.	I find myself doing things without paying attention.
15. Como entre comidas sin estar consciente de que estoy comiendo.	Pico sin ser consciente de que estoy comiendo.	I snack without being aware that I'm eating.

Data collection

Participants from the online platform were recruited via invitations from the authors to acquaintances and students. The prospective participants were asked to log in to the platform in order to sign the informed consent and proceed to complete the questionnaire and demographic data. Participants who completed the paper and pencil version also signed the informed consent.

Measures

The MAAS is a 15-item questionnaire with Likert-type items with response options ranging from 1 (almost always) to 6 (almost never). This scale measures the frequency with which people have experienced states of mindfulness during daily life. Social desirability is controlled by asking participants to answer according to what they "really feel" rather than what they think they "should be feeling". Total scores are obtained by averaging scores from individual items. Higher scores indicate a higher level of mindfulness. According to the authors of the original questionnaire (Brown, & Ryan, 2003), items are distributed across cognitive, emotional, physical, interpersonal and general domains.

The FFMQ (Baer, et al., 2006) is a 39-item questionnaire which measures five facets of mindfulness: observe, describe, act with awareness, non-judge and non-react. It has Likert-type items ranging from 1 (never or very rarely true) to 5 (very often or always true). In the present study, this questionnaire was used in a subsample (n=195) to assess concurrent validity. In the present study, we used a Mexican Spanish translation of the FFMQ, utilizing the exact same translation procedure described for the Mexican Spanish MAAS.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 17 for Mac, and STATA version 12 for Mac for Confirmatory Factor Analysis.

Results

1) Item and Exploratory Factor Analysis (EFA) of the MAAS.

In order to make sure that each item was normally distributed, a frequency distribution analysis was performed. Response options for the MAAS were: 1) almost always, 2) very frequently, 3) somewhat frequently, 4) somewhat infrequently, 5) very infrequently and 6) almost never. Percentages of responses for each item are shown in table 3. None of the response options was answered by more than 50 % of the participants, which is a widely known criterion for eliminating items in any psychometric test, therefore none of the items was eliminated.

Table 3. Percentage of responses for each option.

Item	Response options						Total
	1	2	3	4	5	6	
MAAS 1	5.3	8.0	16.9	21.6	21.4	26.8	100.0
MAAS 2	2.6	4.6	10.7	18.7	20.6	42.7	100.0
MAAS 3	3.4	5.8	16.6	19.2	27.0	28.0	100.0
MAAS 4	11.5	15.8	20.6	17.4	16.8	17.9	100.0
MAAS 5	10.1	13.1	17.9	20.9	20.0	18.1	100.0
MAAS 6	11.0	15.0	13.4	15.0	16.8	28.8	100.0
MAAS 7	3.7	6.7	14.4	19.8	21.9	33.5	100.0
MAAS 8	4.3	6.5	15.3	23.5	19.3	31.0	100.0
MAAS 9	5.1	8.6	14.9	20.9	25.1	25.4	100.0
MAAS 10	4.0	7.0	13.7	19.0	21.1	35.1	100.0
MAAS 11	10.1	14.7	19.8	16.5	15.8	23.0	100.0
MAAS 12	5.0	10.4	14.9	20.1	20.0	29.7	100.0

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Item	Response options						Total
	1	2	3	4	5	6	
MAAS 13	11.2	18.5	27.0	15.3	15.5	12.5	100.0
MAAS 14	3.5	6.1	15.4	21.8	21.6	31.7	100.0
MAAS 15	4.6	5.6	10.2	14.4	16.6	48.6	100.0

Table 4 shows item-total correlations, which indicate the degree by which each item is related to the rest of the questionnaire items. All correlations were significant (p<.001). For comparison purposes, item-total correlations of the original version of the MAAS are shown (Brown, & Ryan, 2003). As can be seen, correlations are higher in the present study compared to Brown and Ryan's original validation, demonstrating a slightly higher internal consistency than Brown and Ryan's study.

Table 4. Item-total correlations.

Item	Sample of Present Study	Brown, & Ryan (2003)
MAAS1	.485**	.45
MAAS2	.583**	.42
MAAS3	.734**	.49
MAAS4	.625**	.39
MAAS5	.546**	.25
MAAS6	.620**	.31
MAAS7	.816**	.72
MAAS8	.779**	.67
MAAS9	.652**	.38
MAAS10	.789**	.61
MAAS11	.518**	.49
MAAS12	.701**	.57
MAAS13	.521**	.26
MAAS14	.806**	.69
MAAS15	.567**	.41

**p<.001

Table 5 shows a contrasted groups comparative analysis. The purpose of this analysis was to determine whether the items were able to discriminate between participants who scored high from those who scored low. Scores below the 1st quartile (n=155, Q1=3.53) were compared against scores above the 3rd quartile (n=322, Q3=5.00) using independent samples t tests. As it can be seen, all items were able to discriminate significantly between low and high scores ($p < .001$).

Table 5. Contrasted groups comparative analysis.

Item	Mean Scores		t Scores
	Low Group	High Group	
MAAS1	3.37	4.86	-11.065**
MAAS2	3.69	5.43	-14.016**
MAAS3	3.03	5.27	-20.184**
MAAS4	2.28	4.43	-17.553**
MAAS5	2.75	4.44	-12.313**
MAAS6	2.59	4.89	-16.274**
MAAS7	2.88	5.45	-25.107**
MAAS8	2.86	5.30	-23.744**
MAAS9	2.99	5.02	-16.866**
MAAS10	2.87	5.44	-23.924**
MAAS11	2.73	4.46	-11.822**
MAAS12	2.81	5.18	-19.663**
MAAS13	2.45	4.10	-12.951**
MAAS14	2.83	5.36	-25.698**
MAAS15	3.68	5.46	-12.812**

**p<.001

To assess the factor structure of the questionnaire, and explore whether it yielded a similar structure than other versions of the MAAS, a factor analysis was performed using the principal component analysis extraction method, obtaining an initial 3-factor solution with Eigen-values larger that 1, which explained 57.66 % of the total variance. However, the analysis of the scree plot reveals a clear "elbow" between the first and the remaining factors (see table 6), therefore suggesting a 1-factor solution, which was the one used for the present study.

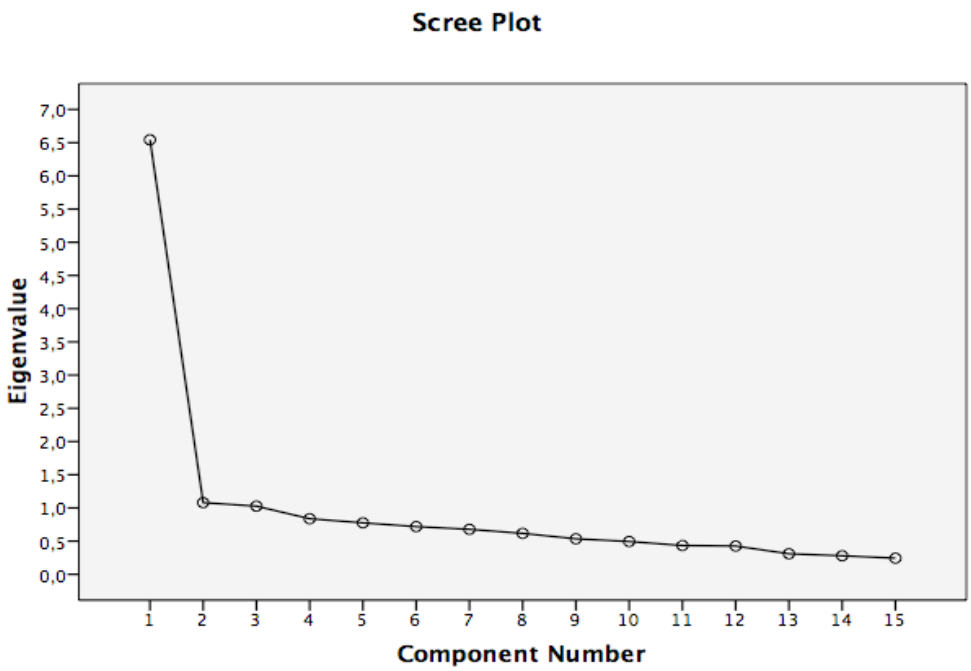

Figure 1. Scree Plot.

The final single-factor solution accounts for 43.62 % of the total variance. The factor structure of the Mexican Spanish translation of the MAAS is thus consistent with previous validations of the MAAS. In this regard, our solution explains a larger amount of variance (43.62 % vs. 42.8 %) than the Spanish version (Soler, et al., 2012), although the difference is discrete. Furthermore, items in our solution had factor loadings ranging from .374 to .732. Table 6 shows the factor loadings of each item, from highest to lowest, in comparison to Brown and Ryan's and Soler et al. The table shows evidence of incremental validity in terms of higher factor loadings for the single-factor solution, especially when compared to the version by Soler et al., i.e., 11 out of 15 items of the Mexican version have higher factor loadings.

Table 6. Factor Loadings (1 factor solution).

Item	Factor loadings		
	Present study	Soler, et al., 2012	Brown, & Ryan, 2003
MAAS5	0.732	0.056	0.27
MAAS14	0.705	0.718	0.77
MAAS7	0.691	0.485	0.78
MAAS10	0.666	0.513	0.69
MAAS8	0.641	0.520	0.74
MAAS4	0.637	0.172	0.45
MAAS2	0.623	0.618	0.45
MAAS12	0.600	0.774	0.62
MAAS3	0.590	0.561	0.51
MAAS1	0.527	0.457	0.46
MAAS11	0.506	0.605	0.55

Esta tabla continúa en la siguiente página —>

Item	Factor loadings		
	Present study	Soler, et al., 2012	Brown, & Ryan, 2003
MAAS13	0.484	0.597	0.28
MAAS9	0.463	0.392	0.38
MAAS15	0.411	0.699	0.47
MAAS6	0.374	0.088	0.33

Extraction Method: Principal Component Analysis

2) Confirmatory Factor Analysis (CFA).

A CFA was conducted to test the goodness of fit of the original MAAS (Brown, & Ryan, 2003), using the following fit indices: standardized root mean square error of approximation (RMSEA) = 0.078 (90 % CI 0.071-0.086), comparative fit index (CFI) = 0.913, chi-square to df ratio (c^2/df) = 4.81 and standardized root mean squared residual (SRMR) = 0.044. Results suggest that the single-factor structure of the Mexican MAAS was adequate. Although c^2/df ratio was somewhat high, considering that a value of no more than 3 is sometimes indicative of a good fit (Carmines, & McIver, 1981), it is also true that ratios as high as 5 may indicate a good fit (Marsh, & Hocevar, 1985), and that larger sample sizes are more likely to have type II errors. Moreover, all of the other fit indices have adequate scores and are similar to other confirmatory factor analyses of the MAAS (cf. Deng et al., 2012; Jermann et al., 2009).

3) Reliability and internal consistency.

Reliability analysis for the total score of the scale demonstrated good reliability: Cronbach's alpha coefficient value was .89, therefore, the scale behaves in a homogeneous way, i.e., items are closely related as a group. Guttman's split half reliability coefficient value was .86, which means that if the scale is divided in half, both parts would have the same variance.

4) Between-groups comparison based on socio-demographic variables.

Table 7 shows MAAS total mean scores and Student's t-scores to assess differences between groups based on several socio-demographic variables. As can be observed, the only variables that presented statistically significant differences between groups were religious practice and alcohol consumption, which will be further addressed in the discussion section.

Table 7. Student's t tests for between-groups comparison based on socio-demographic variables.

Socio-demographic variables	N	Mean	t
Male	220	4.325	1.687
Female	402	4.187	
Currently Working	367	4.210	0.845
Currently not Working	254	4.276	
Has a Relationship	383	4.217	0.603
Does not have a Relationship	239	4.266	
Practices Religion	441	4.338	-2.689*
Does not Practice Religion	159	4.086	
Practices Sports	299	4.280	-0.218
Does not Practice Sports	301	4.263	
Smokes	111	4.210	0.757
Does not Smoke	489	4.285	
Drinks Alcohol	301	4.140	3.379*
Does not Drink Alcohol	299	4.404	

*p<.05

Table 8 shows MAAS total mean scores and F values (one-way ANOVA) to assess differences between groups for additional socio-demographic variables. Significant differences across groups were only found in type of religion ($p < .05$), although there were several missing cases due to capture errors and two outliers were removed (n=157).

Table 8. F scores for between-groups comparison based on socio-demographic variables

Socio-demographic variables	N	Mean	F
Level of Education			
Primary	21	3.971	
Secondary	56	4.259	
High School	134	4.305	1.245
Bachelors	372	4.251	
Masters	36	4.009	
Doctoral	3	3.466	
Marital Status			
Single	329	4.269	
Married	198	4.171	0.604
Divorced/Separated	47	4.156	
Living with a Partner	38	4.345	
Widow/er	9	4.422	
Religion			
None	111	4.009	3.968*
Catholic	296	4.359	
Christian (all but Catholic)	56	4.504	

*p<.05

To assess concurrent validity, a sub-sample (n=195) taken from the total sample completed the Five Facet Mindfulness Questionnaire (FFMQ; Baer, et al., 2006) to perform Pearson correlations for both the total FFMQ score and each of the sub-scales with the MAAS total score. Results are also shown in table 9. MAAS total scores demonstrate significant correlations with the total score (0.452, $p < 0.05$) and 3 out of 5 sub-scales of the FFMQ (observe: $r = 0{,}003$; describe: $r = 0.357$*; act with awareness: $r = 0.561$*; non-judge: $r = 0.340$*; and non-react: $r = -0.070$. * = $p < 0.05$), which suggests adequate concurrent validity. Correlations are somewhat similar in terms of significance compared to results obtained by Soler, et al., except for the non-react sub-scale, which had a non-significant correlation in the present study.

Table 9. Concurrent Validity of the MAAS with FFMQ (Pearson correlation coefficients).

	Total FFMQ Score	"Observe" Sub-scale	"Describe" Sub-scale	"Act with Awareness" Sub-scale	"Non-judge" Sub-scale	"Non-react" Sub-scale
MAAS	0.452*	0.003	0.357*	0.561*	0.340*	-0.070

*p<.05

Discussion

The purpose of the present study was to create a Mexican Spanish translation of the MAAS. For this translation of the MAAS, the psychometric properties were assessed in a Mexican sample, its convergent validity with the FFMQ was tested, and the relationship of the MAAS scores with socio-demographic variables was explored.

Despite the fact that both mindfulness-based interventions and research are quickly growing in popularity, there are, to the best of our knowledge, no published versions of mindfulness questionnaires that measure this construct in a culturally relevant way for the Mexican population. The contribution of this paper is therefore to present a questionnaire that can be used in the Mexican population, where very little mindfulness

research has been conducted so far. Even though there is already a Spanish version of the MAAS, it doesn't indicate if such version has adequate psychometric properties for its use in the Mexican population, therefore it is relevant to assess its psychometric properties to establish its usefulness in this context. Moreover, it seems important to extend mindfulness research beyond White American or European samples, in order to gain cross-cultural evidence for its benefits to health and well-being.

Results obtained here were consistent with those reported by the original MAAS authors (Brown, & Ryan, 2003). In particular, item-total correlations were somewhat higher in the present study compared to the study by Brown, & Ryan, as well as factor loadings for some specific items; all factor loadings of the present study were above 0.374. Furthermore, a single-factor structure was found, which explained 43.62% of the total variance.

Regarding reliability and internal consistency, both Cronbach's Alpha and Guttman's split-halves coefficient showed high scores for the Mexican Spanish version of the MAAS.

Of particular interest is that significant differences in total MAAS scores were found between socio-demographic groups, specifically for religious practice and alcohol consumption, which suggests that levels of mindfulness differ depending on whether people practice religion or not, and whether they consume alcohol or not. These findings are consistent with our original hypotheses. Furthermore, between-groups differences were found regarding specific religions. These findings may point towards affirming that religiosity (including the precept of not consuming intoxicants, found in most religions) is a factor contributing to higher trait mindfulness, that is, religious people may be more likely to have practiced mindfulness. However, we don't know whether study participants have or have not received previous mindfulness training. However, further research is needed in this regard, because it is not clear if cultural differences could play a role in the personal interpretation of the mindfulness construct.

In contrast, no differences between groups were found regarding gender, work status, relationship status, sports practice and smoking, suggesting that mindfulness is not related to these variables and that the Mexican Spanish MAAS measures mindfulness homogeneously in regard to these variables. It is particularly interesting that smoking didn't affect mindfulness levels in our sample, since we hypothesized that there would be differences because smoking is an addictive behavior and such behaviors have been associated with low levels of mindfulness. Moreover, high mindfulness levels have been associated with health behaviors (Carmody, Reed, Kristeller, & Merriam, 2008).

Regarding concurrent validity, MAAS scores were significantly correlated with the total FFMQ score, and in particular with 3 out of 5 of its sub-scales (describe, act with awareness and non-judge), and therefore there is an adequate concurrent validity, given that the FFMQ is a scale that is based on items from several different mindfulness questionnaires, including the MAAS (Baer, et al., 2006). However, it is important to note that the "act with awareness" sub-scale of the FFMQ is based on all but four of the MAAS items (items not included are 1, 4, 5 and 6), so it is not a surprise that a high correlation was found between the act with awareness factor and the total score of the MAAS. By the same token, low correlations with some of the sub-scales of the FFMQ (non-react and observe) could be explained by the fact that the MAAS centers only on one aspect of mindfulness which may not be related closely with an attitudinal component, but rather with an attentional one.

It is worthwhile to mention that despite the number of scales assessing mindfulness and its components, there has been a lively debate lately regarding whether these scales really measure and capture the complexity of the original Buddhist mindfulness construct, or if in fact they measure something else. For instance, it has been pointed out (Grossman, 2011) that the MAAS may not be a measure of mindfulness, but rather a measure of (the opposite of a) perceived lack of attentiveness, and therefore lacking construct validity for measuring mindfulness. The same author has also mentioned that measuring mindfulness in such way is equivalent to saying that scoring low on a depression scale would be the same as feeling happy (Grossman, 2013). While we agree that this is an important point, MAAS scores have shown to be related to other mindfulness questionnaires scores, such as the Five Facet Mindfulness Questionnaire (Baer, et al., 2006) and the Kentucky Inventory of Mindfulness Skills

(Hansen, et al., 2009). MAAS scores are also related to improvements in psychological measures, for instance stress (Tamagawa et al., 2013) and depression (Jermann et al., 2013), or even biological markers, such as salivary cortisol levels (Brown, Weinstein, & Creswell, 2012). The MAAS has therefore been proved useful for research purposes even if might not measure the original Buddhist mindfulness construct, which is still up for further discussion. Therefore, we suggest that further research be made to assess construct validity of the MAAS.

One of the main limitations of the present study is its lack of divergent and predictive validity measurements, so we suggest that further research addresses this particular point. Another suggestion for future research is to assess the psychometric properties of the Mexican MAAS in clinical samples and also to test the application of the scale on behavioral and neurological outcomes for Mexican population, and as a result of specific training in mindfulness.

Despite a lot of open questions to be addressed, the Mexican Spanish translation of the MAAS presented here has proven to be a reliable instrument that can be used to advance mindfulness research in the Mexican population, and further the development of mindfulness measures in the Spanish language in general.

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