Original

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Psychometric proprieties of Spanish version of Mindful Attention Awareness Scale (MAAS)

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The Mindful Attention Awareness Scale (MAAS) is a brief and easy to administer scale that mainly assesses the individual's dispositional capacity to be aware and conscious in day-to-day life experiences.

This is a 15-item self-reported single-factor scale that is exclusively focused on attention/awareness component of mindfulness construct. The instrument can be independently used to assess individuals either with or without meditation experience and has been widely used in mindfulness research.

In order to establish the psychometric proprieties of the MAAS a total of 385 individuals were assessed. 201 individuals came from a clinical sample and 184 control individuals were university students. The MAAS showed good psychometric proprieties in terms of validity and reliability. The scale obtained an adequate convergent validity with the Five Facets Mindfulness Questionnaire (FFMQ) and good discriminating validity with relation to depressive symptoms. Additionally, the MAAS obtained good reliability indexes (Cronbach's $\alpha = 0.89$), good temporal stability and adequately replicates the original single-factor structure accounting for 42.8% of the total variance. These results were comparable to those obtained by the original English version of the scale.

MAAS can be briefly administered and enables us to measure the individual's frequency of mindfulness states in daily life and can be used both on clinical research and healthy subjects.

Propiedades psicométricas de la versión española de la escala Mindful Attention Awareness Scale (MAAS)

La Mindful Attention Awareness Scale (MAAS) es una escala sencilla y de rápida administración que evalúa, de forma global, la capacidad disposicional de un individuo de estar atento y consciente de la experiencia del momento presente en la vida cotidiana.

La escala es un autoinfome unifactorial de 15 ítems con visión del constructo *mindfulness* centrada en la variable atención/consciencia. El instrumento puede ser utilizado en sujetos con o sin experiencia en meditación y es ampliamente utilizado en investigación.

Con el objetivo de establecer las propiedades psicométricas de la MAAS, se administró a un total de 385 sujetos, 201 pertenecientes a una muestra clínica y 184 a una muestra control de estudiantes universitarios. Los análisis psicométricos de la versión española de la MAAS muestran buenas propiedades, tanto en términos de validez como de fiabilidad. El instrumento presentó una buena validez convergente con la Five Facets *Mindfulness* Questionnaire (FFMQ) así como discriminante respecto a la clínica depresiva. Así mismo obtuvo unos buenos índices de fiabilidad (α de Cronbach de 0,89), una buena estabilidad temporal y replica la estructura unifactorial original que agrupa el 42,8% de la varianza total. Los resultados obtenidos resultan congruentes con los estudios realizados con la versión en inglés del instrumento.

La MAAS es un instrumento de simple y rápida administración que nos permite evaluar la capacidad general de *mindfulness* de un individuo y que puede ser utilizado tanto en la investigación clínica como en sujetos sanos.

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INTRODUCTION

Research and clinical applications regarding Mindfulness have been clearly and significantly increasing in the last decade. Although there is no single definition for the concept of mindfulness, this refers to being aware and paying attention [1] and its origin would be in the Oriental meditation tradition.[1-4] The different definitions proposed for the term mindfulness coincide in stressing that of "maintaining awareness of living in the present moment,"[5] the most commonly used definition being that which describes it as "paying attention on purpose to the present moment, without judgment."[6] This is a natural experience, although uncommon, in the daily life. It generally occurs when the situations are of interest to us. In these, attention is maintained on what is occurring. One pays complete attention and with interest until the person finally forms a part of the activity. It must be stressed that mindfulness is an inherent human capacity that can be potentiated.[7] The development of this capacity is achieved through several types of meditation that traditionally have been divided between formal practices that imply a discipline (meditation while setting or in movement) and informal practices, that may be performed in day to day activity (e.g.: mindfulness when eating, taking a shower, driving).[8]

Although there is considerable variability in the methodological rigor of the studies, the psychotherapeutic interventions that have included practices of mindfulness are usually associated with improvements in health terms, general well-being and improvement of the clinical symptoms.[2, 7-10] Furthermore, there are therapies where the techniques of mindfulness are a core feature of the therapeutic program and these have been effective in randomized clinical trials in psychiatric disorders as well as in prevention of recurrences of Depression[11, 12] or in Borderline Personality Disorder (BPD).[13-20]

In spite of the promising results of interventions that have included mindfulness, research in this area has been hindered both by the absence of a clear, unified and operative definition and by the scarcity of construct measurement tools.[21] In this sense, some scales have recently been developed in English that would compensate this absence, such as the *Freiburg* mindfulness *inventory* (FMI[22, 23]), *the Kentucky Inventory of* mindfulness *skills* (KIMS[24]), *the Cognitive and Affective* Mindfulness *Scale Revised* (CAMS-R[25]), *Philadelphia* Mindfulness *Scale* (PHLMS[26]). *Toronto* Mindfulness *Scale* (TMS[21]), *Five Facets* Mindfulness Questionnaire (FFMQ[27]) and the *Mindful Attention Awareness Scale* (MAAS[28]).

Each instrument uses its own terminology to describe and understand mindfulness and, although there is great overlapping of ideas among them, it is still debated whether it is a uni- or multifactorial construct.[27] In contrast to multifactorial approaches where up to five component factors are separated, [29] there are proposals that have summarized the essential features of these interventions into two factors, usually one of awareness and another one of acceptance.[9, 26] For Cardaciotto et al.,[26] mindfulness is the tendency to be highly aware of internal and external experiences in the context of an accepting, nonjudgmental stance towards these experiences. The most reductionist proposals point out the existence of a single factor, that of awareness.[28, 30] This explanatory model is based on the argument that the acceptance component is redundant to that of awareness component, both on the theoretical as well as psychometric level. According to Brown,[28] the increased present moment focused attention will necessarily occur with an attitude of acceptance, in the same way that stressing the non-evaluation stance inevitably entails increased awareness of the present moment.

The MAAS is a coherent self-report with a unifactorial view of the construct that stresses, as an essential aspect of mindfulness, the attention/awareness variable in the present moment. The MAAS scale is a simple scale with rapid administration that evaluates, with a single score, the capacity of the individual to be attentive and aware of the experience of the present moment in the daily life. Its use does not require the subject to have previous experience in meditation and the original version has some good psychometric properties. These characteristics have made the MAAS the most used tool in research studies that have aimed to evaluate mindfulness, for example, in depression,[31] stress,[32, 33] bulimia,[34] chronic pain[35, 36] or cancer.[37, 38] Furthermore, the tool has been validated in other languages such as French and Swedish.[39, 40]

Given the disposition and presence of natural states of mindfulness and the existence of techniques and methods capable of potentiating it, it would be useful to have validated tools to Spanish that measure this construct.

METHODOLOGY

Participants

The total sample of this study was made up of 385 subjects (95 men and 290 women), with a mean age of 31 years (SD = 10.66) and age range 18 to 63 years. The sample included a clinical subgroup (n=201) and another nonclinical one (n=184). The nonclinical sample came from the Psychology Faculty of the University of Valencia and from the University School of Nursing of the Hospital de la Santa Creu i Sant Pau. Mean age for this subsample was 29.4 (SD=10.23) with age range 18 to 62 years, 49 were men and 135 women. There were 201 subjects from the clinical sample who came from the Hospital de la Santa Creu i Sant Pau and the Fundació Althaia de Manresa, and who complied with

the diagnostic criteria for the following disorders: Borderline Personality Disorder (n=71), Recurrent Major Depressive Disorder (n=26), Eating Behavior Disorder (n=54) And Cocaine Dependence Disorder (n=50). Mean age was 33.51 (SD=10.74) with age range 18 to 63 years, 46 were men and 155 women..

Inclusion criteria of the participants of the clinical samples were: age between 18 and 80 years, diagnosis of Borderline Personality Disorder or Recurrent Major Depressive Disorder or Eating Behavior or Cocaine Dependence Disorder according to the DSM-IV-TR criteria.[41] Exclusion criteria were: having an acute psychiatric disease or psychotic sphere disorder, mental retardation, sensory deficits or linguistic problems that did not make it possible to fill out the questionnaires.

Procedure

The clinical sample was conducted using a consecutive sampling of subjects and after verifying compliance of the inclusion and exclusion criteria of the study. After making a proposal to the subjects to participate in the study, they were provided with a case report form with the test to be completed. The healthy control participants filled out the questionnaires in one of the classrooms of the University. All the participants were informed about the objective of the study and their answers were maintained confidential. Participation was totally voluntary, without financial incentives. Prior to filling out the questionnaires, all of the participants signed an informed consent.

The scale adaptation methodology used was that of the translation-back translation procedure.[42] The original scale was translated by a bilingual person with clinical experience. The translations were discussed with one of the investigators until reaching a consensus. The first version was translated back into English by another independent translator (native Anglo-Saxon linguist with experience in the translation of biomedical texts). This version was sent to the authors of the MAAS who, after several corrections, verified the adaption to the original text.

A subsample of 32 participants was chosen for a second application at two weeks of the first administration to perform the Test-Retest reliability study. To establish sensitivity to change, a subsample of 30 patients diagnosed of borderline personality disorder (BPD) after an intervention of mindfulness of the Dialectical Behavior Therapy of 10 weeks duration was analyzed.

MATERIAL

The MAAS[28] is a 15-item questionnaire scored according to the Likert scale with a range going from 1 (almost always) to 6 (almost never). This scale measures the frequency of the state of mindfulness in the daily life and its application does not require any training on the part of the subject. The score is obtained from the arithmetic average of all the items and elevated scores indicate a greater state of mindfulness.

The FFMQ, in its Spanish version,[43] is a 39-item questionnaire, which evaluates five facets of mindfulness: Observing, Describing, Acting with Awareness, non-judging, non-reactivity to inner experience. They are scored using a Likert scale with a range going from 1 (never or very rarely true) to 5 (very often or always true). It was used to evaluate convergent validity.

The Center for Epidemiologic Studies Depression scale -CES-D-[44] is a self-administered scale that evaluates the presence of depressive symptoms in the week prior to its administration. It has 20 items that are scored on a Likert scale with a range between 0 (rarely or never /less than one day) and 3 (much or always /between 5-7 days). The higher the scores, the greater the likelihood of a depressive picture. We evaluated the divergent validity with this scale.

Data analysis

The database was designed and its analysis was made using the SPSS statistical program, version 18.0 for Windows.

For the reliability analysis and internal consistency of the MAAS, Cronbach's α coefficient and reliability coefficient was analyzed for the total score of the scale using the two-halves method with Spearman-Brown correction and Cronbach's α value that the scale would reach if any of its items are eliminated. The construct validity study was performed with exploratory and confirmatory factorization techniques. The study of convergent validity of the MAAS consisted in evaluating the correlation between the score of said scale and that of the subscales of the FFMQ, with an equivalent purpose. The study of its divergent validity was made using Pearson's correlation coefficient with the CES-D depression scale. The study of the temporal stability and reliability was performed with Pearson's correlative coefficient between the two administrations of the scale. Finally, the study of sensitivity to change of the MAAS was performed using a comparison of means with the MAAS scale per se after a 10-week long mindfulness intervention.

RESULTS

Sociodemographic characteristics of the samples

The sociodemographic characteristics of the clinical sample and the control sample are shown in Table 1.

Table 2 shows the items in Spanish and in English that make up the MAAS and the means and standard deviation for each one in our study and in the original version of the scale.

Internal consistency and construct validity

The internal consistency of the scale, evaluated with Cronbach's α statistics is 0.897. In the item by item analysis of the α value, the scale behaves homogeneously and irrelevant items that may harm the global α of the MAAS do not appear. Using the split-halves Reliability coefficient with the Spearman-Brown correction, a value of 0.865 was obtained.

Exploratory Factorial Analysis (EFA)

The EFA of principal components with varimax rotation of the MAAS on a group of 385 subjects shows an initial solution of two factors with own values superior to 1, with values of 6.42 and 1.18 respectively, that groups 50.7% of the total variance. In spite of this, the analysis of the scree chart clearly suggests a unifactorial solution (see chart 1). The final solution of a single factor makes it possible to account for 42.8% of the total variance. A KMO sampling adequacy index of 0.926 was obtained and the Bartlett's Test of sphericity showed an exploratory $p < 0.001$.

Table 3 shows that factorial loads of the 15 items on the scale for said factor of attention and awareness.

Confirmatory Factorial Analysis (CFA)

A CFA was conducted to study the goodness of fit of the factorial structure. To perform the analysis, the EQS 6.0[45] was used. The confirmatory model was estimated using the maximum likelihood but with robust corrections of Satorra-Bentler in the standard errors and statistics and fit indices.[45] The following indicators of goodness of fit were used: CFI (Comparative Fit Indices), GFI (Goodness of Fit Index), AGFI (Adjusted General Fit Index), RMSEA (Root Mean Square Error of Approximation) and $_{sb}X^2$. In accordance with Hu and Bentler,[46] the following criteria were used to indicate that there was a good fit: CFI, GFI and AGFI >0.90 and RMSEA <0.08 were considered acceptable. These criteria were chosen because they have shown their stability in previous investigations.[46, 47]

The only model that has been tested in a single factor model represented by 15 items. The monofactorial structure produced the following fit indices: $_{sb}X^2 = 229.3904$ ($p<0.001$), (CFI= 0.920, GFI=0.884, AGFI=0.845, SRMR=0.053, RMSEA= 0.71 [0.059-0.082]). Considering these fit indexes, it can be said that the unifactorial model of the MAAS had adequate fit indices.

| Table 1	Sociodemographic characteristics of the clinical and control samples	
	Non-clinical subgroup (n=184)	Clinical subgroup (n=201)
Gender		
Men	26.89%	22.9 %
Women	73.11%	77.1%
Mean age	29.39 (SD= 10.22)	33.51 (SD=10.74)
Studies		
Primary		37.5%
Secondary		41.3%
University	100%	20.6%
Civil status		
Single	63%	56.1%
With partner/ married	36%	31.1%
Separated	1%	12.8%
Work status		
Working	30%	34.54%
Unemployed/not working		27.32%
Sick leave		27.32%
Only studies	70%	10.80%
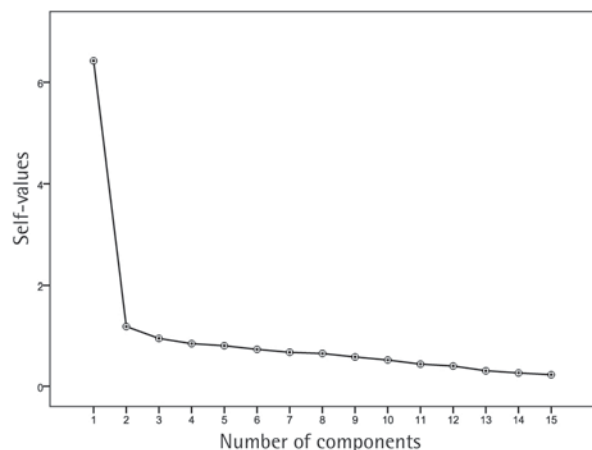
| Figure 1 | Scree chart of the MAAS |

Convergent and divergent validity

We determined the convergent validity of the MAAS scale by means of the comparison between the scores obtained in said scale and those obtained in the FFMQ. Table 4 shows the scores of the MAAS scale and the five subscales of the FFMQ: Observing, Describing, Acting with Awareness, non-judging, non-reactivity to inner experience.

Table 2	Statistical description of the items in Spanish and the original items in English			

Items in Spanish	(M± SD)	Items in English	(M± SD)
Podría sentir una emoción y no ser consciente de ella hasta más tarde.	(4.33±1.32)	I could be experiencing some emotion and not be conscious of it until some time later.	(4.14 ± 1.44)
Rompo o derramo cosas por descuido, por no poner atención, o por estar pensando en otra cosa.	(4.46±1.39)	I break or spill things because of carelessness, not paying attention, or thinking of something else.	(4.34 ± 1.63)
Encuentro difícil estar centrado en lo que está pasando en el presente.	(4.10±1.45)	I find it difficult to stay focused on what's happening in the present.	(4.29 ± 1.38)
Tiendo a caminar rápido para llegar a dónde voy, sin prestar atención a lo que experimento durante el camino.	(3.15±1.50)	I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	(3.12 ± 1.68)
Tiendo a no darme cuenta de sensaciones de tensión física o incomodidad, hasta que realmente captan mi atención.	(3.81±1.45)	I tend not to notice feeling of physical tension or discomfort until they really grab my attention.	(3.70 ±1.59)
Me olvido del nombre de una persona tan pronto me lo dicen por primera vez.	(3.27±1.69)	I forget a person's name almost as soon as I've been told it for the first time.	(3.26± 1.76)
Parece como si "funcionara en automático" sin demasiada consciencia de lo que estoy haciendo.	(3.89±1.42)	It seems I am "running on automatic," without much awareness of what I'm doing.	(3.95± 1.51)
Hago las actividades con prisas, sin estar realmente atento a ellas.	(3.85±1.34)	I rush through activities without being really attentive to them.	(3.77± 1.44)
Me concentro tanto en la meta que deseo alcanzar, que pierdo contacto con lo que estoy haciendo ahora para alcanzarla.	(3.97±1.37)	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.	(3.96±1.52)
Hago trabajos o tareas automáticamente, sin darme cuenta de lo que estoy haciendo.	(3.92±1.31)	I do jobs or tasks automatically, without being aware of what I'm doing.	(3.90±1.46)
Me encuentro a mi mismo escuchando a alguien por una oreja y haciendo otra cosa al mismo tiempo.	(3.53±1.31)	I find myself listening to someone with one ear, doing something else at the same time.	(3.15±1.50)
Conduzco "en piloto automático" y luego me pregunto por qué fui allí.	(4.43±1.42)	I drive places on 'automatic pilot' and then wonder why I went there.	(4.74±1.55)
Me encuentro absorto acerca del futuro o el pasado	(3.48±1.57)	I find myself preoccupied with the future or the past	(2.84±1.62)
Me descubro haciendo cosas sin prestar atención.	(4.00±1.39)	I find myself doing things without paying attention.	(3.95±1.38)
Pico sin ser consciente de que estoy comiendo	(4.58±1.52)	I snack without being aware that I'm eating.	(4.77±1.52)

The divergent validity of the scale was established by the correlation of the scores of the MAAS with the CES-D self-applied depression scale. A Pearson correlation of -0.558 with a p < 0.001 was obtained.

Temporal stability

The temporal stability of the MAAS scale was studied in a subgroup of 32 subjects of the non-clinical sample, by the comparison of the scores obtained between two consecutive administrations separated by two weeks. A Pearson correlation of 0.823 with a p < 0.001 was obtained.

Sensitivity to change

To establish the capacity of the scale to detect changes in the mindfulness skills, a comparison was made of the means for paired samples. The scores obtained in the MAAS before and after the application of the 10-week long mindfulness model of the dialectical behavioral therapy (BDT) in a clinical subsample of 30 patients diagnosed of borderline personality disorder (BPD). In the T-test, no significant differences were observed between both administrations, these having a Pearson correlation of 0.789 with p <0 .001.

Table 3	Factorial loads and items of the MAAS
Items of the MAAS	**Factor 1 Attention /Awareness**
maas-12	0.774
maas-14	0.718
maas-15	0.699
maas-2	0.618
maas-11	0.605
maas-13	0.597
maas-3	0.561
maas-8	0.520
maas-10	0.513
maas-7	0.485
maas-1	0.457
maas-9	0.392
maas-4	0.172
maas-6	0.088
maas-5	0.056

CONCLUSIONS

In spite of the growing use of therapies and training in mindfulness, there are no measurement instruments regarding the capacity of this construct adapted to our sociocultural setting. The MAAS allows global measurement of this capacity and it is a tool having rapid administration and simple correction. The results obtained in this study indicate good reliability and validity of the Spanish version of the MAAS. It has elevated internal consistency, indicating significant global homogeneity of the instrument as well as good interdependence between the items comparable to that obtained in the original English version of the instrument.[28]

The exploratory factorial analysis reveals a factorial solution of a single factor similar to that obtained by the authors in the original analysis of the scale.[28] The percentage of variance explained by this single factor, that of 43%, is superior to that obtained in the validation study of the French version and in the applications of the MAAS to adolescent samples and psychiatric populations,[39, 48] although less than that obtained in the original validation and in samples of patients with cancer.[28, 38] Furthermore, this factorial structure shows goodness fit indices for CFA. In the review of the psychometric behavior of each item making up the MAAS, 12 out of the 15 items had factorial loads in the rotated matrix greater than 0.30 except for items 5, 6 and 4. Similar to the results obtained in the original analysis,[28] the items with loads less than 0.03 are maintained within the scale because significant content is added to the scale. In the analysis of the wide constructs, as in this case, lower factorial loads are not uncommon.[50] On the other hand, the fitting of the data in the CFA indicates the stability of the instrument with its original 15-item configuration.

The correlations obtained between the MAAS and the subscales of the FFMQ indicate an elevated convergent validity. As was to be expected, the MAAS correlates with greater intensity with the subscale of Act with Awareness. This is probably due to the closeness of the FFMQ subscale to the underlying idea of mindfulness in the MAAS. In fact, the configuration of the items of the subscale of the Act with Awareness subscale of the FFMQ was derived from a factorial analysis with different scales of mindfulness[29] that grouped several items of the MAAS itself. The MAAS scale also significantly correlates with the subscales of non-judge and non-reactivity to inner experience. This correlation is interesting as it deals with two subscales that are closer to the attitude in which the mindfulness is practiced than to the form in which it is carried out. This relation could support an overlapping between the two factors that traditionally constitute mindfulness, that is, "presence" and "acceptance." In this sense, Brown and Ryan,[49] when they analyzed large samples of subjects that later resulted in the creation of the MAAS, observed that measuring the acceptance factor did not add any explanatory advantages on the psychometric level regarding when only the presence factor was used. As acceptance would be functionally redundant in mindfulness, it was eliminated in the next writing of the MAAS.[30] Finally,

Table 4	Convergent validity of the MAAS and the subscales of the FFMQ				
	Observing	**Describing**	**Acting with awareness**	**Not Judging**	**Non-reactivity**
MAAS	-0.047	0.463**	0.808**	0.523**	0.310**

MAAS = Mindful Attention Awareness Scale; FFMQ = Five Facets *Mindfulness* Questionnaire.
** p< 0.001

it also correlated with the subscale of Description, which refers to the capacity of a person to express their experience in words, either in terms of thoughts, sensations or feelings. It seems congruent to expect that when there is any subjective experience that can be verbalized, this has to have become conscious previously. The only subscale of the FFMQ with which the MAAS does not establish any significant relation is with that of Observation. The latter groups a combination of items related with the capacity to being attentive to and describing a large variety of perceptions, mostly sensory ones. As a whole, the correlations described and the absence of relation with the subscale Observation have also been reported in another previous study of validation.[40]

The divergent validity of the MAAS was established by comparing it with the presence of depressive symptoms evaluated using the CES-D scale. The dispositional capacity of mindfulness has a clear inverse relation to the depression symptom of −0.558. This relation is along the same sense as that observed in the original validation where the same scale was used and a significant correlation of −0.37 was observed in a sample of 327 students. This result is coherent with other works that have compared the scale with depressive symptoms.[28, 39, 31] On the contrary to other studies, in our study, no scale for anxious symptoms was used. Although this is a limitation, the psychometric results obtained with the affective symptoms would not lead to the expectation of a different behavior regarding the anxious symptoms.

The temporal reliability of the scale was very high and very similar to that obtained in the original study of the MAAS that was 0.81. It should be pointed out that this elevated concordance may be favored by the use of a shorter temporal period in our study, that of two weeks, compared to the four weeks of the original study.[28]

Finally, in our study, the MAAS was not a sensitive-to-change instrument. No significant differences were observed between the scores obtained before and after an intervention of mindfulness. The absence of differences could be explained by a lack of sensitivity of the instrument to change, but also because of the type of intervention and subsample used. On the other hand, the intervention of mindfulness used was a model of the BDT,[1] which gives less importance to the formal practices compared to other interventions in which the MAAS has been used and it has been sensitive.[31, 37] On the other hand, the sample used was of patients diagnosed of BPD. It is a sample of elevated clinical severity and one that usually entails problems to acquire and maintain new healthy behavioral habits. Therefore, the level of practice could not be sufficient to be statistically detectable.[8, 51]

In conclusion, the Spanish translation of the MAAS is a valid and reliable instrument to measure the individual differences in the capacity of being attentive to and aware of the experience of the moment present in the Spanish population. This questionnaire can be used to investigate the impact of the clinical interventions based on mindfulness and to study the attention and awareness at the present moment.

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