The Kentucky Inventory of Mindfulness Skills in Greek Undergraduate and Postgraduate Students

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Abstract

The Kentucky Inventory of Mindfulness Skills (KIMS) is a widely used multidimensional tool for assessing the tendency of the individual to be mindful in everyday life. The aim of the present study was to standardize a Greek version of KIMS and to explore its psychometric properties in the Greek population. A sample of 213 Greek undergraduate and postgraduate students from various educational institutions completed the questionnaires. The Mindful Attention and Awareness Scale (MAAS), Toronto Alexithymia Scale (TAS-20), and Perceived Stress Scale (PSS-14) were used to evaluate the criterion validity of KIMS. The Principal component analysis (PCA) resulted in a four-component solution, similar to the structure of the English version of the inventory: "Observing," "Describing," "Acting with awareness," and "Accepting without judgment." All components combined accounted for 45.79% of variance. The subscales had adequate internal consistency, and their scores were correlated with MAAS, TAS, and PSS scores, indicating satisfying

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criterion validity. Associations between the "Observing" subscale and demographic characteristics were also revealed. This version of KIMS can be safely utilized for assessing mindfulness skills and the efficacy of mindfulness-based interventions in Greek populations.

Keywords

Mindfulness · KIMS · Students · Alexithymia · Stress · Kentucky inventory

1 Introduction

Mindfulness is defined as non-judgmental observation of continuous waves of internal and external stimuli, just as they occur [1]. A more functional definition of mindfulness is as follows: the awareness emerging from intentional and non-judgmental focusing of attention on the present moment and on the experience unfolding every minute. These aspects of attention and awareness can be developed through mindfulness meditation [2]. Historically, mindfulness has its origins in the principals of Buddhist meditation [3]. Nevertheless, during the last 60 years, these Buddhist traditions have been adopted by the western world [4] as techniques being practiced in everyday life as well as intense courses of meditation conducted by specialized teachers. Mindfulness has attracted western countries' interest, as focusing on here and now is a universal, innate human need and ability [2]. Furthermore, mindfulness practice concerns a variety of skills possible to be taught irrespective of religious beliefs [5] and traditional meditation [6]. These skills have been applied in various types of medical and psychological interventions, such as the mindfulness-based stress reduction, (MBSR) [5], the mindfulness-based cognitive therapy (MBCT) [7], and the dialectical behavior therapy (DBT) [8].

Numerous instruments have been constructed for measuring mindfulness. The Kentucky Inventory of Mindfulness Skills (KIMS) is one of the most widely used. This tool was constructed by Baer et al. for the assessment of the general tendency of individuals to be mindful in everyday life. The authors intended to create a measure whose items would be understandable both by general and clinical populations, even if the respondents had never practiced any kind of meditation. The assessment concerns four basic mindfulness skills corresponding to four subscales of the inventory: "Observing," "Describing," "Acting with awareness," and "Accepting without judgment" [9].

KIMS has demonstrated good content validity, moderate to high internal consistency reliability, and good test-retest reliability [9]. It has been translated and standardized in various languages, such as Swedish [10], German [11], French [12], Dutch [13], and Chinese [14]. It has been used in studies conducted both on healthy samples [9, 10, 12, 13], such as students, parents, civil servants, community samples, and relatives of individuals with mental disorders, and on clinical samples, such as people with borderline personality disorder [9, 10, 12], major depressive disorder, posttraumatic stress disorder [11], and alcohol dependence [15].

A large number of studies have assessed mindfulness using KIMS, and its subscales have shown a positive correlation with mental health, emotional intelligence [9], quality of life [10], self-expression in social circumstances, ability to empathize, satisfaction with body image [11], and sustained and executive attention [16]. In addition, KIMS' subscales have been negatively correlated with levels of psychopathology [10], alexithymia, neuroticism [9, 13, 15], depression [17], feeling of hopelessness [12], anxiety and sensitivity to it [18], negative affectivity [19], and perceived stress [20, 21]. Lastly, KIMS has been used in interventional studies to assess the effectiveness of mindfulness-based stress reduction programs [19, 22–24]. Therefore, KIMS appears to be helpful for assessing mindfulness both in observational and interventional studies conducted in the general population and clinical samples.

The absence of such a tool from the Greek research field was the motive for the present study. The purpose of this study was to translate

KIMS into Greek and to standardize this inventory in Greek population. Given that mindfulness is negatively correlated with alexithymia and perceived stress, cross-validation of the Greek version of KIMS was conducted using the Mindful Attention and Awareness Scale (concurrent validity), Toronto Alexithymia Scale, and Perceived Stress Scale (predictive validity).

2 Methods

2.1 Measures

2.1.1 Demographic Data

Requested information concerned gender, age, marital status, educational level, and educational institution.

2.1.2 Kentucky Inventory of Mindfulness Skills (KIMS)

This self-report instrument consists of 39 items. Participants rate each item according to the degree the statement describes what is generally true for them. Rating is built on a five-point Likert scale (1 = never or very rarely true, 5 = almost always or always true). Some of the sentences directly describe the mindfulness skill which is rated, while others describe a skill's absence and reverse scoring needs to be applied. High scores represent more mindfulness. KIMS includes four subscales: "Observing," "Describing," "Acting with awareness," and "Accepting without judgment." "Observing" concerns the participant's tendency to observe a variety of stimuli, both internal, such as body sensations, thoughts, and emotions, and external, such as sounds and colors. "Describing" refers to the tendency to describe and put into words a wide range of phenomena. "Acting with awareness" means full participation in current activity with undivided attention. "Accepting without judgment" means to accept reality as it is, without trying to change it and without putting evaluative labels on facts [9].

2.1.3 Mindful Attention and Awareness Scale (MAAS)

This scale, constructed by Brown and Ryan, includes 15 items, which refer to a single factor and assess the individual's tendency to act in "automatic pilot" without paying attention on current experience. Answers are given on a six-point Likert scale ranging from 1 (almost always) to 6 (almost never). High scores correspond to more mindfulness. Other factors of mindfulness, such as accepting situations without criticism, are not measured, as, according to the authors, focusing on here and now and awareness are the fundamental principles of mindfulness [25]. This tool has been standardized in the Greek population and has good psychometric properties [26]. In the present study, the internal consistency of MAAS was also adequate (Cronbach's $\alpha = 0.86$).

2.1.4 Toronto Alexithymia Scale (TAS-20)

This is a self-reported scale created by Bagby, Parker, and Taylor [27]. TAS-20 includes 20 items, which comprise three subscales: "Difficulty identifying feelings," "Difficulty describing feelings," and "Externally oriented thinking." "Difficulty identifying feelings" refers to the individual's difficulty to identify his/her own emotions and make a distinction between them and bodily sensations associated with emotional arousal. "Difficulty describing feelings" refers to the difficulty to describe feelings to others. "Externally oriented thinking" assesses the tendency of individuals to direct their attention externally. The respondent indicates the degree to which he/she agrees with each statement using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). High scores mean high levels of alexithymia. This scale has been adapted to the Greek population and good validity and reliability have been reported [28]. Moreover, in this study, TAS-20 and its subscales appeared to have adequate internal consistency (Cronbach's α: "Difficulty describing feelings" = 0.81, "Difficulty identifying feel-

ings" = 0.79, "Externally oriented thinking" = 0.65, Total = 0.84).

2.1.5 Perceived Stress Scale (PSS-14)

Perceived Stress Scale is a 14-item self-reported scale measuring the degree to which an individual perceives situations of his/her life as stressful [29]. The respondent is asked to indicate the frequency to which he/she experienced the reported thoughts and feelings during the previous month based on a five-point Likert scale (from 0 (never) to 4 (very often)). This scale includes seven positive and seven negative statements, and the total score is calculated summing the ratings for each item, after firstly all the positive items have been reversed (minimum total score = 0, maximum total score = 56). High scores reflect high levels of perceived stress. Good psychometric properties of this scale have been reported in the general population of Greece [30]. In this study, PSS-14 was found to have satisfactory internal consistency (Cronbach's alpha = 0.85).

2.2 Procedure and Sample Translation

Independent forward translations of the original KIMS were conducted by two translators and backward translation was performed by one translator, native speaker [31]. The Greek KIMS was pretested on a sample of five individuals, so as to indicate ambiguous questions and determine the final form.

2.2.1 License

After contacting the developer of the inventory, it was ascertained that permission was not required to use KIMS.

2.2.2 Data Collection

The study took place in Attica, Greece. Questionnaires were distributed between January and May 2020. Participants were fully informed about the study purpose and completed the questionnaires voluntarily and anonymously. Completion required 15 minutes approximately.

2.2.3 Sample

The sample constituted 217 Greek undergraduate and postgraduate students of various educational institutions. Two hundred and thirteen of them completed the questionnaires (98.16% return rate).

2.3 Data Analysis

Data are presented as N (%) for qualitative variables, namely, gender, marital status, and education level, and as mean (SD) for quantitative variables, such as age and scales' and subscales' scores. Principal component analysis (PCA) was conducted to extract the factors of KIMS. Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity were applied to assess the sample's adequacy and the correlation among the items, respectively. The varimax rotation method was used to maximize the loadings of items. Items were assigned to factors to whom loadings were greater than 0.3. Cronbach's alpha for internal consistency, the percentage of variance explained, and eigenvalues were calculated for each one of the extracted factors. Range, mean, SD, minimum, and maximum were also used to describe factors. Correlations between KIMS' subscales, as well as between KIMS' subscales and other measurements of the study, were calculated. Normality of data distribution was tested, and, as it was violated, nonparametric Spearman's rho coefficient was used to assess correlations. Nonparametric Mann-Whitney U and Kruskal-Wallis tests were conducted to evaluate between group differences. The SPSS program v.25 for Windows was used to perform statistical analyses and $p = 0.05$ was considered to be the level of significance for all analyses.

3 Results

In Table 1, sociodemographic characteristics of the study's sample are reported. Subjects were mostly females (75.60%), young adults with mean age 23.92 (SD = 5.69), unmarried (94.40%), and BSc students (78.90%). Mean scores and

Table 1 Sociodemographic characteristics of the study's sample, scales, and subscales of measurements

Sociodemographic characteristics	N (%)	Age, scales, and subscales scores	Mean (SD)
Gender		Age	23.92 (5.69)
Females	161 (75.60)		
Males	51 (23.90)	KIMS "Observing"	35.24 (6.90)
Other	1 (0.5)		
		KIMS "Describing"	32.88 (5.63)
		KIMS "Acting with awareness"	28.59 (5.66)
Marital status		KIMS "Accepting without judgment"	26.44 (7.37)
Unmarried	201 (94.40)		
Married	9 (4.20)	MAAS	3.88 (0.76)
Other	3 (1.40)		
		TAS "Difficulty describing feelings"	13.09 (3.94)
		TAS "Difficulty identifying feelings"	17.34 (5.34)
Education level		TAS "Externally oriented thinking"	15.00 (3.71)
IVET/IPS	2 (0.94)		
BSc	168 (78.87)	TAS total	45.25 (10.56)
MSc	41 (19.25)		
PhD	2 (0.94)	PSS	28.50 (7.89)

SD standard deviation, *KIMS* Kentucky Inventory of Mindfulness Skills, *MAAS* Mindfulness Attention Awareness Scale, *TAS* Toronto Alexithymia Scale, *PSS* Perceived Stress Scale. *IVET/IPS* Institute of Vocational Training/ Institute of Professional Studies, *BSc* Bachelor of Science, *MSc* Master of Science, *PhD* Doctor of Philosophy

standard deviations (SD) for KIMS, MAAS, TAS, PSS, and their subscales are also reported.

Table 2 presents the rotated factor loadings of principal component analysis (PCA) for the 38 mindfulness skills items, which were finally included in the inventory. The sample's adequacy was confirmed by the Kaiser-Meyer-Olkin measure (KMO = 0.819), and, according to the Bartlett's test of sphericity $\chi 2(741) = 3493.57$, $p < 0.0001$, the correlation among the items was satisfactory, so as to proceed to PCA. The scree plot (not presented) indicated the selection of four components, corresponding to four subscales, similar to the structure of the inventory's English version: "Observing," "Describing," "Acting with awareness," and "Accepting without judgment." All components had eigenvalues >1 and in combination explained 45.79% of variance. The item "When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things" did not load adequately to any of the factors. Thus, it was excluded from the final list of items. In the English version, the item "I pay attention to how my emotions affect my thoughts and behavior" loaded on the subscale "Observing." However, in the Greek version this item presented an adequate loading on the subscale "Describing."

Table 3 presents main descriptive measures of the four subscales of KIMS. Given the possible ranges, the dispersion of subscales in this study was found to be satisfying.

Table 4 presents the correlations between KIMS subscales. According to this table, "Observing" scores are positively correlated with "Describing" scores ($p < 0.05$) and negatively with "Accepting without judgment scores" ($p < 0.01$). Moreover, "Describing" is positively correlated with "Acting with awareness" ($p < 0.01$) and "Accepting without judgment" ($p < 0.05$). "Acting with awareness" is positively correlated with "Accepting without judgment" ($p < 0.01$).

Table 5 presents associations between KIMS' subscales and other variables, namely, demographic characteristics, MAAS, TAS, and PSS. Females were more skilled in "Observing" compared to males ($p = 0.003$). Regarding the educational level, significant difference was observed in the "Observing" subscale ($p = 0.024$). Married subjects had higher scores in the "Observing" subscale compared to the other cat-

Table 2 Rotated factor loadings of the principal components analysis (PCA) for 38 mindfulness skills items ($N = 213$)

Item	"Observing"	"Describing"	"Acting with awareness"	"Accepting without judgment"
"I notice changes in my body, such as whether my breathing slows down or speeds up."	0.43			
"I pay attention to whether my muscles are tense or relaxed."	0.37			
"When I'm walking, I deliberately notice the sensations of my body moving."	0.61			
"When I take a shower or bath, I stay alert to the sensations of water on my body."	0.52			
"I notice how foods and drinks affect my thoughts, bodily sensations, and emotions."	0.35			
"I pay attention to sensations, such as the wind in my hair or sun on my face."	0.76			
"I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing."	0.75			
"I notice the smells and aromas of things."	0.66			
"I intentionally stay aware of my feelings."	0.35			
"I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow."	0.68			
"I notice when my moods begin to change."	0.43			
"I'm good at finding the words to describe my feelings."		0.75		
"I can easily put my beliefs, opinions, and expectations into words."		0.65		
"I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound."		0.55		
"It's hard for me to find the words to describe what I'm thinking."		0.71		
"I have trouble thinking of the right words to express how I feel about things."		0.79		
"When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words."		0.59		
"Even when I'm feeling terribly upset, I can find a way to put it into words."		0.71		
"My natural tendency is to put my experiences into words."		0.71		
"I pay attention to how my emotions affect my thoughts and behavior."		0.33		

Item	"Observing"	"Describing"	"Acting with awareness"	"Accepting without judgment"
"When I do things, my mind wanders off and I'm easily distracted."			0.65	
"When I'm doing something, I'm only focused on what I'm doing, nothing else."			0.77	
"I drive on 'automatic pilot' without paying attention to what I'm doing."			0.31	
"When I'm reading, I focus all my attention on what I'm reading."			0.65	
"When I do things, I get totally wrapped up in them and don't think about anything else."			0.63	
"I don't pay attention to what I'm doing because I'm daydreaming, worrying, or Otherwise distracted."			0.70	
"I tend to do several things at once rather than focusing on one thing at a time."			0.47	
"When I'm working on something, part of my mind is occupied with other topics, such as what I'll be doing later, or things I'd rather be doing."			0.64	
"I get completely absorbed in what I'm doing, so that all my attention is focused on it."			0.74	
"I criticize myself for having irrational or inappropriate emotions.				0.70
I tend to evaluate whether my perceptions are right or wrong."				0.32
"I tell myself that I shouldn't be feeling the way I'm feeling."				0.73
"I believe some of my thoughts are abnormal or bad and I shouldn't think that way."				0.75
"I make judgments about whether my thoughts are good or bad."				0.71
"I tend to make judgments about how worthwhile or worthless my experiences are."				0.67
"I tell myself that I shouldn't be thinking the way I'm thinking."				0.78
"I think some of my emotions are bad or inappropriate and I shouldn't feel them."				0.76
"I disapprove of myself when I have irrational ideas."				0.69
Eigenvalues	2.64	5.28	2.93	7.00
% of variance	6.78	13.54	7.51	17.96
Cronbach's α	0.78	0.84	0.81	0.88

Table 3 Descriptive characteristics of the four subscales of KIMS

Subscale	Items	Range	Mean	SD	Minimum	Maximum
"Observing"	11	11–55	35.24	6.90	19	55
"Describing"	9	9–45	32.88	5.63	18	45
"Acting with awareness"	9	9–45	28.59	5.66	10	44
"Accepting without judgment"	9	9–45	26.44	7.37	9	42

SD standard deviation

Table 4 Correlations (Spearman's rho) between KIMS subscales

	"Observing"	"Describing"	"Acting with awareness"	"Accepting without judgment"
"Observing"	1			
"Describing"	0.166a	1		
"Acting with awareness"	−0.126	0.217b	1	
"Accepting without judgment"	−0.214b	0.174a	0.338b	1

[a]Correlation is significant at the 0.05 level (two-tailed)
[b]Correlation is significant at the 0.01 level (two-tailed)

egories ($p = 0.016$). "Describing," "Acting with awareness," and "Accepting without judgment" skills were significantly positively correlated with MAAS scores. The "Describing," "Acting with awareness," and "Accepting without judgment" subscales were significantly negatively correlated with the TAS "Difficulty describing feelings" and the TAS "Difficulty identifying feelings" subscales. "Observing" and "Describing" were significantly negatively correlated with TAS "Externally oriented thinking," and "Accepting without judgment" was significantly but positively associated with TAS "Externally oriented thinking." All the KIMS subscales were significantly negatively associated with the total TAS score. "Describing," "Acting with awareness," and "Accepting without judgment" scores were significantly negatively associated with PSS scores.

4 Discussion

During the last decades, mindfulness practice has proved helpful for reducing the symptoms of a wide variety of mental and physical health disorders [32]. Thus, it is of prominent importance to clarify whether patients learn and develop the skills that mindfulness-based treatments intend to teach and whether improvement in their clinical conditions can be attributed to these learned skills. Tools for assessing mindfulness are necessary for this purpose [33].

This study provides evidence that a Greek version of KIMS is reliable and valid. Adaptation was conducted in a sample of 213 Greek undergraduate and postgraduate students of various academic institutions. The four-factor structure resulting from the principal component analysis comes in accordance with previous studies [9, 11–13], and it was found to explain 45.79% of the inventory's variance. The items presented adequate loadings onto the factors, except for the item "When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things," which did not have a sufficient loading to any of the factors. As a result, this item was not included in the Greek version of KIMS. In the English version of the inventory, this item was assigned to the "Acting with awareness" subscale. One explanation could be that Greek students' tendency to disperse their thoughts while they are doing simple house tasks does not have to do with their skills to focus their attention on more demanding activities, such as working and driving, and to let themselves be absorbed by these activities. Furthermore, in the Greek version of KIMS, the item "I pay attention to how my emotions affect my thoughts and behavior" had an acceptable loading on the "Describing"

Table 5 Association between KIMS subscales and other study measurements

Study measurements	Categories	"Observing"	"Describing"	"Acting with awareness"	"Accepting without judgment"
Gender Mean (SD)	Males	32.85 (5.52)	32.15 (5.41)	27.71 (4.88)	26.59 (6.01)
	Females	35.51 (6.18)	33.27 (5.75)	29.67 (5.27)	26.27 (7.64)
	p-value	0.003	0.563	0.383	0.719
Education level Mean (SD)	IVET/IPS	29.50 (3.54)	39.00 (2.83)	29.00 (8.49)	31.50 (0.71)
	BSc	34.61 (6.71)	32.80 (5.68)	28.66 (5.69)	26.14 (7.57)
	MSc	38.03 (7.22)	32.90 (5.59)	28.12 (5.66)	27.44 (6.78)
	PhD	40.00 (4.24)	32.50 (2.12)	32.00 (2.83)	25.50 (3.54)
	p-value	0.024	0.400	0.581	0.480
Marital status Mean (SD)	Unmarried	34.99 (6.95)	32.84 (5.70)	28.59 (5.67)	26.50 (7.33)
	Married	41.00 (2.88)	33.56 (4.64)	29.67 (6.10)	25.44 (8.50)
	Other	36.67 (5.69)	33.33 (4.73)	25.33 (2.52)	25.33 (9.87)
	p-value	0.016	0.874	0.297	0.990
MAAS	Spearman's rho	−0.085	0.285	0.529	0.414
	p-value	0.223	0.000	0.000	0.000
TAS "Difficulty describing feelings"	Spearman's rho	−0.099	−0.656	−0.291	−0.287
	p-value	0.151	0.000	0.000	0.000
	Spearman's rho	−0.118	−0.583	−0.368	−0.417
TAS "Difficulty identifying feelings"	p-value	0.089	0.000	0.000	0.000
TAS "Externally oriented thinking"	Spearman's rho	−0.287	−0.257	−0.059	0.142
	p-value	0.000	0.000	0.399	0.041
TAS total	Spearman's rho	−0.195	−0.640	−0.333	−0.289
	p-value	0.005	0.000	0.000	0.000
PSS	Spearman's rho	−0.023	−0.270	−0.392	−0.472
	p-value	0.742	0.000	0.000	0.000

SD standard deviation, *MAAS* Mindfulness Attention Awareness Scale, *TAS* Toronto Alexithymia Scale, *PSS* Perceived Stress Scale. *PSS* Perceived Stress Scale. *IVET/IPS* Institute of Vocational Training/ Institute of Professional Studies, *BSc* Bachelor of Science, *MSc* Master of Science, *PhD* Doctor of Philosophy

subscale. Nevertheless, in the original KIMS version, this item loaded on the "Observing" subscale. This finding could be attributed to social and cultural factors; it seems that Greek students perceive this item differently from American students and outpatients with borderline personality disorder, which were the samples utilized for the construction of the English KIMS [9]. All the four factors of the inventory presented satisfactory internal consistency, as has been confirmed in previous reports [9–13].

Associations between KIMS' subscales appeared to be moderate and significant. However, the association between the "Observing" and "Acting with awareness" subscales was found to be insignificant. "Observing" was negatively associated with "Accepting without judgment." It seems that individuals tending to observe external stimuli and their own thoughts and feelings also have the tendency to judge and try to change them. These results agree with those of other studies [9–13].

Regarding demographic characteristics, females, subjects with a higher educational level, and married participants were found to be more skilled in "Observing." The finding that females presented higher scores in the "Observing" subscale than males agrees with reports from a Swedish study [10], while Baer et al. [9] found no difference between the two genders in "Observing." Additionally, three of the KIMS' subscales were positively associated with MAAS, indicating satisfactory concurrent validity for KIMS. All the subscales of KIMS were observed to be negatively associated with the total TAS score, and three of the KIMS' subscales were negatively associated with PSS, as expected [9, 13, 15, 20, 21], suggesting good predictive validity for KIMS. It appears that individuals having more developed mindfulness skills tend to experience less difficulties identifying and describing their emotions. Moreover, participants with more mindfulness seem to have less perceived stress, namely, they seem to feel more capable of coping with stressors, to consider their lives as less uncontrollable and to present less negative reactions to stress [29]. These findings provide support for the protective role of mindfulness skills against mental health issues and for the benefits that mindfulness-based interventions can have on individuals suffering from stress-related disorders.

The present study has some limitations. Firstly, the generalization of the results is limited, as the sample was not representative of the whole Greek population. The sample included undergraduate and postgraduate students exclusively. Thus, it is possible that the study sample consisted of highly educated participants. Moreover, most of the subjects were young adults, hampering the generalization of the findings to middle-aged and older adults. Secondly, no clinical sample was utilized for this study. Despite these, adequacy of the sample size and good criterion validity permit to recommend this inventory for future studies in Greek populations. Thirdly, considering that some of the questionnaires were completed during the pandemic of coronavirus disease 2019 (COVID-19), it is possible that this stressful condition altered the PSS scores, since previous studies indicate that the pandemic might lead to increased levels of stress in university students [34]. Lastly, no test-retest reliability evaluation was conducted. Future research should be performed in community and clinical samples, such as individuals with mental health disorders, and include test-retest assessment.

In conclusion, this Greek version of KIMS meets requirements for criterion validity and internal consistency and can be safely recommended for future research in the Greek population. This measure could be proven useful for the assessment of mindfulness skills of various healthy and clinical populations as well as for evaluating the efficacy of mindfulness-based treatment and stress-management programs.

References

1. Baer RA (2003) Mindfulness training as a clinical intervention: a conceptual and empirical review. Clin Psychol Sci Pract 10(2):125–143
2. Kabat-Zinn J (2003) Mindfulness-based interventions in context: past, present, and future. Clin Psychol Sci Pract 10(2):144–156

3. Thera N (2005) The heart of buddhist meditation: Satipaṭṭhāna: a handbook of mental training based on the Buddha's way of mindfulness, with an anthology of relevant texts translated from the Pali and Sanskrit. Buddhist Publication Society
4. Batchelor, S. (1994). The awakening of the west: the encounter of Buddhism and Western culture, 542 BC-1992
5. Kabat-Zinn J (1982) An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. Gen Hosp Psychiatry 4(1):33–47
6. Dimidjian S, Linehan MM (2003) Defining an agenda for future research on the clinical application of mindfulness practice. Clin Psychol Sci Pract 10(2):166–171
7. Teasdale JD, Segal ZV, Williams JMG, Ridgeway VA, Soulsby JM, Lau MA (2000) Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. J Consult Clin Psychol 68(4):615
8. Lynch TR, Chapman AL, Rosenthal MZ, Kuo JR, Linehan MM (2006) Mechanisms of change in dialectical behavior therapy: theoretical and empirical observations. J Clin Psychol 62(4):459–480
9. Baer RA, Smith GT, Allen KB (2004) Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. Assessment 11(3):191–206
10. Hansen E, Lundh LG, Homman A, Wångby-Lundh M (2009) Measuring mindfulness: pilot studies with the Swedish versions of the mindful attention awareness scale and the Kentucky inventory of mindfulness skills. Cogn Behav Ther 38(1):2–15
11. Baum C, Kuyken W, Bohus M, Heidenreich T, Michalak J, Steil R (2010) The psychometric properties of the Kentucky Inventory of Mindfulness Skills in clinical populations. Assessment 17(2):220–229
12. Nicastro R, Jermann F, Bondolfi G, McQuillan A (2010) Assessment of mindfulness with the French version of the Kentucky Inventory of Mindfulness Skills in community and borderline personality disorder samples. Assessment 17(2):197–205
13. Dekeyser M, Raes F, Leijssen M, Leysen S, Dewulf D (2008) Mindfulness skills and interpersonal behaviour. Personal Individ Differ 44(5):1235–1245
14. Xu X, Wu D, Zhao X, Chen J, Xia J, Li M et al (2016) Relation of perceptions of educational environment with mindfulness among Chinese medical students: a longitudinal study. Med Educ Online 21(1):30664
15. Stasiewicz PR, Bradizza CM, Gudleski GD, Coffey SF, Schlauch RC, Bailey ST et al (2012) The relationship of alexithymia to emotional dysregulation within an alcohol dependent treatment sample. Addict Behav 37(4):469–476
16. Galla BM, Hale TS, Shrestha A, Loo SK, Smalley SL (2012) The disciplined mind: associations between the Kentucky Inventory of Mindfulness Skills and attention control. Mindfulness 3(2):95–103
17. Vinci C, Spears CA, Peltier MR, Copeland AL (2016) Facets of mindfulness mediate the relationship between depressive symptoms and smoking behavior. Mindfulness 7(6):1408–1415
18. Mahoney CT, Segal DL, Coolidge FL (2015) Anxiety sensitivity, experiential avoidance, and mindfulness among younger and older adults: age differences in risk factors for anxiety symptoms. Int J Aging Hum Dev 81(4):217–240
19. McKee L, Zvolensky MJ, Solomon SE, Bernstein A, Leen-Feldner E (2007) Emotional-vulnerability and mindfulness: a preliminary test of associations among negative affectivity, anxiety sensitivity, and mindfulness skills. Cogn Behav Ther 36(2):91–101
20. Whitesman SL, Hoogenhout M, Kantor L, Leinberger KJ, Gevers A (2018) Examining the impact of a Mindfulness-Based Stress Reduction intervention on the health of urban South Africans. Afr J Prim Health Care Fam Med 10(1):5
21. Schoormans D, Nyklíček I (2011) Mindfulness and psychologic well-being: are they related to type of meditation technique practiced? J Altern Complement Med 17(7):629–634
22. Epstein-Lubow G, McBee L, Darling E, Armey M, Miller IW (2011) A pilot investigation of mindfulness-based stress reduction for caregivers of frail elderly. Mindfulness 2(2):95–102
23. Yoon BS (2014) The effect of Korean version of mindfulness based stress reduction program on stress and distraction of university students. Korean J Stress Res 22(4):231–240
24. Klawonn A, Kernan D, Lynskey J (2019) A 5-week seminar on the biopsychosocial-spiritual model of self-care improves anxiety, self-compassion, mindfulness, depression, and stress in graduate healthcare students. Int J Yoga Ther 29(1):81–89
25. Brown KW, Ryan RM (2003) The benefits of being present: mindfulness and its role in psychological well-being. J Pers Soc Psychol 84(4):822
26. Mantzios M, Wilson JC, Giannou K (2015) Psychometric properties of the Greek versions of the self-compassion and mindful attention and awareness scales. Mindfulness 6(1):123–132
27. Bagby RM, Parker JD, Taylor GJ (1994) The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. J Psychosom Res 38(1):23–32
28. Tsaousis I, Taylor G, Quilty L, Georgiades S, Stavrogiannopoulos M, Bagby RM (2010) Validation of a Greek adaptation of the 20-item Toronto Alexithymia Scale. Compr Psychiatry 51(4):443–448
29. Cohen S, Kamarck T, Mermelstein R (1983) A global measure of perceived stress. J Health Soc Behav:385–396
30. Katsarou A, Panagiotakos D, Zafeiropoulou A, Vryonis M, Skoularigis I, Tryposkiadis F, Papageorgiou C (2012) Validation of a Greek version of PSS-14; a global measure of perceived stress. Cent Eur J Public Health 20(2):104–109
31. Trust MO (1997) Trust introduces new translation criteria. Med Outcome Trust Bullet 5:3–4

32. Academic Mindfulness Interest Group, M, Academic Mindfulness Interest Group, M (2006) Mindfulness-based psychotherapies: a review of conceptual foundations, empirical evidence and practical considerations. Aust N Z J Psychiatry 40(4):285–294
33. Baer RA (2011) Measuring mindfulness. Contemp Buddhism 12(1):241–261
34. Odriozola-González P, Planchuelo-Gómez Á, Irurtia MJ, de Luis-García R (2020) Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. Psychiatry Res:113108