

# Validation of the Arabic Version of the Freiburg Mindfulness Inventory (FMI-Ar) Among a Sample of Lebanese University Students

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## Research Article

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# Abstract

## Background

Mindfulness presents a self-regulation tool allowing the individual to recognize and accept mental experiences. We chose to validate the short form of FMI called FMI-14, since it contains all aspects of the original long version and it can be used among various general population. Interests in including mindfulness techniques in medical and psychological fields has been increasing recently. Accordingly, it is important to validate FMI-14-Ar to help professionals living in the Arabic speaking countries. Thus, the main objective of this study was to validate the Arabic version of the Freiburg Mindfulness Inventory (FMI-Ar) among a sample of Lebanese university students.

## Methods

This study is a cross-sectional one carried out between July and September 2021 and enrolling 363 Lebanese university students recruited through convenience sampling through several Lebanese universities. The questionnaire included socio-demographic characteristics and the following scales: Lebanese Anxiety Scale (LAS-10) to assess anxiety, Patient Health Questionnaire (PHQ-9) to assess depression and Freiburg Mindfulness Inventory (FMI) to assess mindfulness. To estimate categorical confirmatory factor analysis of the FMI scale the Mplus was used and SPSS software version 23 was used for data analysis.

## Results

Participants mean age was  $22.65 \pm 3.48$  years, and the majority 61.7% were females. The fit indices of the confirmatory factor analysis (CFA) of the one-factor model of the FMI came out as follows:  $\chi^2/df = 218.33/77 = 2.83$ , RMSEA = 0.071 [0.060-0.082], CFI = 0.92 and TLI = 0.90. The Cronbach's alpha value for the total scale was excellent (0.92). Additionally, the FMI score was negatively associated with anxiety ( $r = -0.48$ ;  $p < 0.001$ ) and depression ( $r = -0.51$ ;  $p = 0.001$ ).

## Conclusion

All hypotheses (factor, convergent, and divergent validity) related to the FMI-Ar were verified in our study. Therefore, professionals can now benefit from the FMI-Ar, a suitable scale to measure mindfulness among Lebanese university students.

## Background

Mindfulness means non-judgmental awareness aiming to understand and accepting each thought, feeling or physical sensation as it is (Bishop et al., 2004; Trousselard et al., 2010). Mindfulness presents a self-regulation tool allowing the individual to recognize and accept mental experiences [2]. During the last few decades, Kabat-Zinn was the first to use mindfulness as an intervention technique, after that, investigation in mindfulness field increased and became associated with cognition and behavioral therapies [3]. Various techniques were also developed in addition to Mindfulness Based Interventions (MBI) such as Dialectical Behavior Therapy (DBT) used to treat borderline personality disorder by decreasing self-harming, decreasing depression and increasing hope and social functioning [4], in addition to Acceptance and Commitment Therapy (ACT) used to help individuals to enhance the psychological wellbeing and accepting personal experiences [5]. In psychology, mindfulness techniques have been used to regulate emotional distress and maladaptive behaviors and improving wellbeing [6].

In order to assess mindfulness, various self-reported questionnaires were developed. First, Mindful Attention Awareness Scale (MAAS) consisting of fifteen items used to assess mindfulness and focusing on awareness but not acceptance of what is occurring in the present moment [7]. The Kentucky Inventory of Mindfulness Skills (KIMS) focusing on the following 4 factors: observing, describing, acting with awareness, and accepting without judgment [8]. The Cognitive and Affective Mindfulness Scale (CAMS) consisting of twelve items and assessing attention, awareness, present-focus, and non-judgmental acceptance with taking into consideration daily thoughts and feelings [9]. The Toronto Mindfulness Scale (TMS) consisting of 13 items, measuring 2 factors associated with mindfulness (curiosity and decentering) and investigating the state of meditation [10]. Additionally, the Five-Facet Mindfulness Questionnaire (FFMQ) assessing the following 5 factors: observing, describing, awareness, no judging of inner experience, and non-reactivity to personal events [11] and the Freiburg Mindfulness Inventory (FMI) [8].

The Freiburg Mindfulness Inventory (FMI) was developed qualitatively out of the original Buddhist concept of mindfulness, used to measure the present event non-judgmentally and assess openness to negative events [12]. The original FMI scale is consisting of 4 factors and 30 items [12]. We chose to validate the short form called FMI-14, since it contains all aspects of the original long version but independently from a Buddhist or meditation context [6]; therefore, it can be used by individuals with no or little knowledge in meditation techniques [6]. Two main factors were identified in the FMI short version namely presence and acceptance [13, 14]. FMI-14 has been validated among different communities and presented good psychometric qualities [2, 15], therefore its applicable to all populations. Additionally, FMI can be applied in clinical practice and various research contexts enrolling general healthy individuals [8, 16].

Previous investigations highlighted the positive role of mindfulness on emotion regulation [17, 18], in increasing happiness and satisfaction [19, 20], and decreasing anxious and depressive symptomatology over time [11]. Clinical and experimental studies explained that measuring mindfulness is very important to help people in dealing with their mental and physical problems and to optimize health benefits [21]. Therefore, interests in including mindfulness techniques in medical and psychological fields has been

increasing recently. Accordingly, it is important to validate a tool for health care professionals living in the Arabic speaking countries and specifically in Lebanon to assess mindfulness and its effective role in enhancing wellbeing. Thus, the main objective of this study was to validate the Arabic version of the Freiburg Mindfulness Inventory (FMI-Ar) among a sample of Lebanese university students. We expect that the scale will show one factor (H1) and will have a good internal consistency (H2). We also hypothesize that the mindfulness score will negatively correlated with mental health issues (anxiety and depression) (H3).

## Methods

### Participants

Participants received the online Google form link to the survey. Involved people were encouraged to visit a website that would guide them to the consent form, information form (purpose of the current study, anonymity, voluntariness of consent to research), and questionnaire. All participants responded willingly to the survey. There were no fees for participating in the study.

A total of 363 students participated in this study; their mean age was  $22.65 \pm 3.48$  years, with 61.7% females. Other characteristics are summarized in Table 1.

Table 1  
Sociodemographic and other characteristics of the participants (N=363).

Variable	N (%)
<b>Sex</b>	
Male	139 (38.3%)
Female	224 (61.7%)
<b>Marital status</b>	
Single	343 (94.5%)
Married	20 (5.5%)
	<b>Mean <math>\pm</math> SD</b>
<b>Age (in years)</b>	22.65 $\pm$ 3.48
<b>Physical activity index</b>	27.94 $\pm$ 20.44
<b>Household crowding index</b>	1.01 $\pm$ 0.53
<b>Depression</b>	9.01 $\pm$ 6.34
<b>Anxiety</b>	18.19 $\pm$ 8.22

# Study Design and Participants

This cross-sectional study was carried out between July and September 2021. A total of 363 university students were recruited through convenience sampling through several universities in Lebanon's governorates (Beirut, Mount Lebanon, South, North and Beqaa). All university students over the age of 18 were eligible to participate. Excluded were those who refused to complete the survey.

## Minimal sample size calculation

A minimal sample of 280 participants was deemed necessary to validate the FMI, based on 20 participants per 1 scale item [22].

## Questionnaire and variables

The Arabic self-administered questionnaire with closed-ended questions was anonymous; the questionnaire required approximately 20 min to be completed. The questionnaire consisted of different sections. The first part clarified socio-demographic characteristics: age, gender, marital status, and household crowding index. The latter, reflecting the socioeconomic status of the family, was calculated by dividing the number of persons in the house by the number of rooms in the house excluding the bathrooms and kitchen [23]. The physical activity index was calculated by multiplying the intensity by the frequency by the time of physical activity.

The second part of the questionnaire included the following scales:

### Freiburg Mindfulness Inventory (FMI)

Freiburg Mindfulness Inventory (FMI) is composed of 14 items describing all aspects of mindfulness. This instrument is used to characterize the person's experience of mindfulness. Each item is scored based on a 4-point Likert scale with 1 = rarely and 4 = always. Higher total score means more mindfulness [6].

### Lebanese Anxiety Scale (LAS-10)

Lebanese Anxiety Scale (LAS-10) is a 10-item instrument measuring the severity of anxiety symptoms among Lebanese adults [24] and adolescents [25]. Higher scores indicate higher anxiety levels. The Cronbach's alpha in this study was 0.89.

### Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a short 9-item instrument deriving from PHQ. This instrument is used to screen the major depression; if five or more of the 9 depressive symptom criteria are present at least "more than half the days" in the previous two weeks, and one of the symptoms is depressed mood or anhedonia [26]. PHQ-9 total score is ranging from 0 to 27, with higher score means more severe depressive symptoms [26]. The Arabic version of PHQ-9 was previously validated in Lebanon [27]. The Cronbach's alpha in this study was 0.90.

Translation procedure

# Forward translation into Arabic

A mental health expert, fluent in English and his native language is Arabic, was responsible of the forward translation of FMI-14. This step is important in order to establish semantic equivalence between the English and Arabic versions while using a simple translation vocabulary. After that, an expert team, consisting of the original translator and healthcare professionals, assessed the scale to ensure that the Arabic translated version was idiomatically and conceptually equivalent.

## Back translation into English

A native English speaker, fluent in Arabic and unaware of FMI-14 items and the original English version, blindly back-translated the scale to English. The group of experts then reviewed the back-translated version in order to identify discrepancies and resolve any contradictions between the versions. This procedure was repeated until all ambiguities were eliminated.

## Statistical analysis

The Mplus (v. 7.2. Muthén & Muthén, 2012) was used to estimate categorical confirmatory factor analysis of the FMI scale. Given it comprises only two response-options, we used tetrachoric correlation matrix as an input and applied weighted least squares with means and variances adjusted estimation method. Multiple indices of goodness-of-fit were described: the Relative Chi-square ( $\chi^2/df$ ) (cut-off values: <2-5), the Root Mean Square Error of Approximation (RMSEA) (close fit are considered for values  $\leq 0.08$ ), and the Comparative Fit Index (CFI) (acceptable values are  $\geq 0.90$ ) [28].

Data analysis was conducted using SPSS software version 23. Cronbach's alpha was recorded for reliability analysis for all the scales. The normality of distribution of the mindfulness score was confirmed via a calculation of the skewness and kurtosis; values for asymmetry and kurtosis between -1 and +1 are considered acceptable in order to prove normal univariate distribution [29] and in samples bigger than 300 [30]. Pearson correlation test was used to correlate two continuous variables; in psychological research, values of 0.1 were considered small correlations, whereas values of 0.2 and 0.3 were classified as being moderate and large correlations respectively [31]. A  $p < 0.05$  was considered significant.

## Results

### *Factor validity- Hypothesis 1*

The fit indices of the confirmatory factor analysis (CFA) of the one-factor model of the FMI described in previous papers [2, 32–34] came out as follows:  $\chi^2/df = 218.33/77 = 2.83$ , RMSEA = 0.071 [0.060-0.082], CFI = 0.92 and TLI = 0.90. Item 13 was removed from the analysis since it did not have any loading. All other items were retained, with standardized factor loadings described in Figure 1. Although a two-factor model yielded a similar fit to the data as did the one-factor model, the latent covariation between factors

equaled  $\rho = .97$ ;  $p < .001$ , making them empirically impossible to differentiate. Thus, we did not interpret this model.

### *Internal consistency- Hypothesis 2*

The Cronbach's alpha value for the total scale was excellent (0.92). The total item correlations varied between 0.62 and 0.79 (Table 2).

Table 2  
Correlation between the total score and each item of the scale.

Item	Total-item correlation
FMI 1	0.69
FMI 2	0.68
FMI 3	0.72
FMI 4	0.79
FMI 5	0.68
FMI 6	0.65
FMI 7	0.79
FMI 8	0.73
FMI 9	0.79
FMI 10	0.77
FMI 11	0.63
FMI 12	0.76
FMI 14	0.62
Numbers refer to Pearson correlation coefficients; $p < 0.001$ for all correlations	

### *Divergent validity- Hypothesis 3*

The FMI score was negatively associated with anxiety ( $r = -0.48$ ;  $p < 0.001$ ) and depression ( $r = -0.51$ ;  $p = 0.001$ ).

## **Discussion**

While we proceeded with dimension assessment to decide which model structure we should keep, both models showed good fit indices with a slight advantage for the one-factor model regarding the RMSEA value. In addition, the very high correlation between factors 1 and 2 in the second model ( $r = 0.97$ ) virtually

indicates that these items measure the same component. Results concerning the number of factors to retain for the FMI remains controversial; while some studies are in favor of one factor [2, 32, 33], others are in favor of two factors [13, 34]. Item 13 (e.g. "I'm impatient with myself and with others") did not have a good loading on the factor ( $<0.2$ ), therefore was removed from the analysis similar to the French validation of the scale [2, 34]. We strongly believe that mindfulness could be assessed using the total score since those two factors do not assess different dimensions. Thus, the first hypothesis was verified.

The internal consistency of the total scale FMI-Ar was excellent (0.92), with values  $> 0.8$  are considered to be good [35]. Higher than that of the original ( $\alpha = 0.79$ ) [6], Turkish ( $\alpha = 0.85$ ) [33], Dutch ( $\alpha = 0.85$ ) [32], and French ( $\alpha = 0.77$ ) [2] versions. In addition, the correlations between each item and the total score were very good. We might consider then that we verified the second hypothesis.

In terms of divergent validity, mindfulness was significantly associated with lower anxiety and depression. Our results corroborate those from previous studies [36]. The results of a meta-analysis among 12,145 patients showed that mindfulness-based interventions lowered mental health issues (anxiety primarily followed by depression) [37]. Therefore, the third hypothesis was also verified.

## Limitations

This is a cross-sectional study, which means causation cannot be inferred. This study cannot determine a causality between mindfulness and mental health issues. This study is cross-sectional thus recall bias might be present and this bias may have led to an overestimation of the answers given to some questions. Participants may have misunderstood some of the questions, which is a source of information bias. Symptoms were self-reported (not evaluated by a healthcare professional) and thus are subjective. Additionally, a main reason for selection bias is the refusal rate. Results of this study cannot be generalized to the whole population because the sample included university students only, who were recruited by using the snowball technique.

## Conclusion

All hypotheses (factor, convergent, and divergent validity) related to the FMI-Ar were verified. The scale had also an excellent internal consistency. Subsequently, researchers and clinicians can now benefit from the FMI-Ar, a suitable scale to measure mindfulness among Lebanese university students.

## Abbreviations

MAAS

Mindfulness Attention Awareness Scale.

KIMS

Kentucky Inventory of Mindfulness Skills.

CAMS

Cognitive and Affective Mindfulness Scale.

TMS  
Toronto Mindfulness Scale.  
FFMQ  
Five-Facet Mindfulness Questionnaire.  
FMI  
Freiburg Mindfulness Inventory.  
FMI-Ar  
Freiburg Mindfulness Inventory – Arabic version.  
LAS-10  
Lebanese Anxiety Scale.  
PHQ-9  
Patient Health Questionnaire.  
RMSEA  
Root Mean Square Error of Approximation.  
CFI  
Comparative Fit Index.

## **Declarations**

### **Ethics Approval and Consent to Participate**

The Psychiatric Hospital of the Cross Ethics and Research Committee approved this study protocol (HPC-007-2021). A written informed consent was considered obtained from each participant when submitting the online form. All methods were performed in accordance with the relevant guidelines and regulations.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

All data generated or analyzed during this study are not publicly available to maintain the privacy of the individuals' identities. The dataset supporting the conclusions is available upon request to the corresponding author.

### **Competing interests**

The authors have nothing to disclose.

### **Funding**

None.

### **Author contributions**

SO, RR and SH designed the study; SH and ZB wrote the paper; SH and RR carried out the analysis and interpreted the results; SO reviewed the paper for intellectual content; all authors read and approved the final manuscript.

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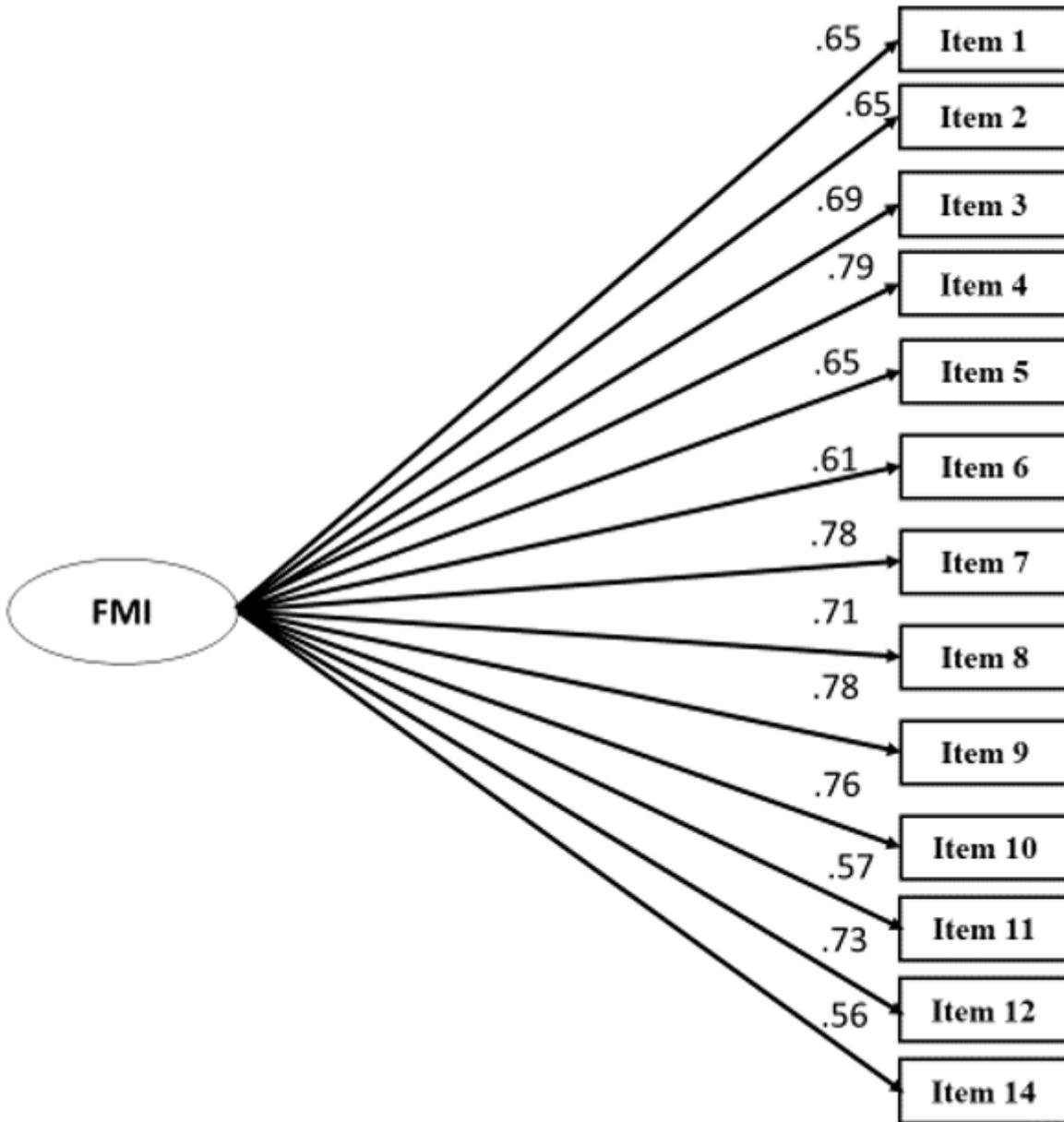
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## Figures



**Figure 1**

Standardized factor loadings of the one-factor model of the Arabic version of the Freiburg Mindfulness Inventory ( $p < 0.001$  for all loadings)