Validation of the Spanish version of the Five Facets of Mindfulness Questionnaire

in a Sample of Argentinean College Students

Abstract

Mindfulness has been conceptualized as intentionally paying attention to the present moment without judgment. The Five Facets of Mindfulness Questionnaire (FFMQ) is one of the most popular measures to assess trait mindfulness. The accurate assessment of mindfulness dispositions is essential for both clinical and research purposes. However, there is limited evidence regarding the psychometric properties of FFMQ in Argentinian samples. **Objective.** The present study aimed to examine reliability and structural and concurrent validity of the Spanish version of the FFMQ in a sample of Argentinian college students. **Methods.** A sample of 632 students (69% women; M_{age} = 24.47, SD = 5.76) enrolled at five public universities in Argentina completed an online survey that assessed mindfulness-related traits (Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience), emotion regulation strategies, facets of anxiety sensibility, and symptoms of depression, anxiety, and stress. **Results.** FFMQ subscales exhibited adequate internal consistency values (α between 0.77 and 0.89; ω between 0.79 and 0.89). An intercorrelated five-factor model structure showed acceptable fit to the data. The findings also supported configural, metric and scalar invariance across sex and mindfulness experience. The FFMQ demonstrated sensitivity to discriminate participants with vs without mindfulness experience. We also observed significant correlations between mindfulness dimensions and theoretically-related variables. **Conclusions.** The present findings support the reliability and validity of FFMQ scores among Argentinian college students. This evidence supports the use of the FFMQ as an appropriate instrument for assessing dispositional mindfulness in Argentinian college students.

Keywords: Mindfulness, College Students, Psychometric Properties, Validation Study

Mindfulness refers to "bringing one's complete attention to the experiences occurring in the present moment, in a nonjudgmental or accepting way" (Baer et al., 2006, p. 27). Over the last few decades, researchers have shown a growing interest in mindfulness-related traits and particularly in the evaluation of the efficacy of mindfulness-based interventions to address a wide array of mental health disorders and symptoms like anxiety, depression, stress and alcohol-related problems (Bayır & Aylaz, 2020; Fjorback et al., 2011; Galante et al., 2013; Hofmann et al., 2010; Khoury et al., 2013; Pearson et al., 2015). The accurate assessment of mindfulness disposition is essential for both clinical and research purposes (Bravo et al., 2022). Specifically, it is necessary to correctly identify differences in mindfulness-related traits among individuals with different mindfulness experiences or as a result of a mindfulness intervention. It is also essential to examine the association between mindfulness and other relevant psychological constructs by evaluating potential underlying mechanisms of mental health problems (Brown et al., 2015; Pearson et al., 2015). In this context, past research has focused on the development of various self-report measures to assess mindfulness.

Baer et al. (2006) proposed the Five Facets of Mindfulness Questionnaire (FFMQ), a 39-item 5-factor measure derived from previous questionnaires including the Kentucky Inventory Mindfulness Skills (KIMS; Baer et al., 2004), Freiburg Mindfulness Inventory (FMI; Buchheld et al., 2001), Mindfulness Questionnaire (MQ; Chadwick et al., 2008), Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003) and the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman et al., 2007). The FFMQ, one of the most popular and frequently used measures for assessing trait mindfulness, has been used worldwide to assess mindfulness. Indeed, several studies have examined the psychometric properties of the FFMQ-39 in different countries and languages (e.g., United States and United Kingdom [Baer et al., 2008; Curtiss &

Klemanski, 2014]; Germany [Christopher et al., 2012]; Netherlands and Belgium [de Bruin et al., 2012]; China [Deng et al., 2011]; Italy [Giovannini et al., 2014]; France [Heeren et al., 2011]; Spain [Aguado et al., 2015; Cebolla et al., 2012]; Chile [Schmidt & Vinet, 2015]; Colombia [(Manotas et al., 2014]; Argentina [Anchorena et al., 2017]).

The FFMQ posits that mindfulness is a multifaceted construct comprising of five different dimensions. These facets are Observing (defined as attending to or noticing internal and external experiences); Describing, which refers to the ability to express in words one's experiences; Acting with Awareness (Awareness), defined as attending to one's present moment activity, rather than an automatic behavior; Nonjudging of Inner Experience (Nonjudging), which refers to accepting and not evaluating thoughts and emotions, and Nonreactivity to Inner Experience (Nonreactivity), a dimension measuring the ability to detach from thoughts and emotions, allowing them to come and go without getting involved or carried away by them (Gu et al., 2016). While most studies find significant low-to-moderate positive correlations between the five facets (e.g., Arthur et al., 2018; Baer et al., 2006; Christopher et al., 2012; de Bruin et al., 2012), some have found negative correlations between Observing and Awareness/Nonjudging facets (e.g., Cebolla et al., 2012; Giovannini et al., 2014; Schmidt & Vinet, 2015).

Findings have also been mixed when examining the underlying structure of the 39-items FFMQ, with some supporting a five-factor correlated model (i.e., all five facets are correlated) and some supporting a hierarchical model (i.e., all five facets load onto a higher order factor). In samples comprising meditators, several studies found evidence supporting (i.e., good fit) the correlated or the hierarchical models with five factors (Baer et al., 2006; de Bruin et al., 2012; Williams et al., 2014). Similar to studies with meditators, in samples composed of people with none or some experience with mindfulness, researchers found that both the five correlated facets (Baer et al., 2006; de

Bruin et al., 2012; Hou et al., 2014; Okafor et al., 2022; Tran et al., 2013; Van Dam et al., 2012) or the hierarchical five-factor models (Christopher et al., 2012; Giovannini et al., 2014) presented good fit. However, different studies found that the Observing facet presented low or negative correlations with the rest of the dimensions and non-significant loadings onto the second order factor (Baer et al., 2006; Heeren et al., 2011; Sugiura et al., 2012; Williams et al., 2014). Therefore, these studies tested a four-correlated and a hierarchical four-correlated models (both models excluding the Observing facet) and these models showed better fit to the data. The hierarchical four-correlated model also presented good fit in samples comprising of meditators (Williams et al., 2014). Additionally, Cebolla et al. (2012) and Heeren et al. (2011) found support for another model where four factors loaded onto a second order factor and the Observing facet remained isolated. Further, Aguado et al. (2015) examined a bifactor model with all FFMQ items (i.e., each item loading onto a general factor of mindfulness and also onto their corresponding factor) and showed that the bifactor model presented better fit than the correlated five-factor model.

Studies conducted with clinical samples mainly show similar results to those conducted with individuals with none or some experience with mindfulness (Williams et al., 2014). However, a few differences emerged. Curtiss and Klemanski (2014) found, in a sample experiencing anxiety and mood disorders, that the Observing facet loaded significantly onto the second order factor, along with other facets. Instead, Sweeney et al. (2021) found, in a sample with depression, that all facets except Nonjudging loaded significantly onto the second order factor. Moreover, Veehof et al. (2011) and Bohlmeijer et al. (2011) observed, in samples of individuals with fibromyalgia, depression, and anxiety that the correlated or hierarchical five-factor models showed an adequate fit.

Regarding the internal consistency evidence of the FFMQ-39 scores, findings generally support adequate reliability ($\alpha > .70$) across facets (e.g., Anchorena et al., 2017; Baer et al., 2006; Bohlmeijer et al., 2011; Cebolla et al., 2012; Christopher et al., 2012; Curtiss & Klemanski, 2014; de Bruin et al., 2012; Giovannini et al., 2014; Heeren et al., 2011; Manotas et al., 2014; Sweeney et al., 2021; Taylor & Millear , 2016; Williams et al., 2014); although a few studies found low internal consistency ($\alpha < .70$) for Observing, Nonjudging, or Nonreactivity (Deng et al., 2011; Hou et al., 2014; Mandal et al., 2016; Schmidt& Vinet ., 2015; Sugiura et al., 2012; Tran et al., 2013; Veehof et al., 2011). Additionally, past research provided criterion-related validity evidence. For instance, scores on different facets (e.g., Describing, Awareness, Nonjudging, Nonreactivity) or the total score significantly negatively correlated with measures of anxiety, depression, stress or emotion regulation (Baer et al., 2006; Cebolla et al., 2012; Curtiss & Klemanski 2014; Giovannini et al., 2014; Hou et al., 2014; Schmidt & Vinet, 2015). For the Observing facet, past work found significant positive correlations with anxiety, depression and stress (Schmidt & Vinet, 2015; Sugiura et al., 2012; Sweeney et al., 2021). Although limited, some evidence also suggests that the correlated five-factor model is invariant across participants' sexes and level of mindfulness experience (Okafor et al., 2022).

Finally, even though the psychometric properties of the FFMQ have been tested in different populations (Baer et al., 2008; Cebolla et al., 2012; Christopher et al., 2012; de Bruin et al., 2012; Manotas et al., 2014), only two psychometric studies are known, based on the models proposed by Baer et al. (2006), conducted with the Spanish version of the FFMQ. One of these studies (Cebolla et al., 2012) involved a Spanish sample (Mean age 27.4 years [SD = 8.3], age range 16-63) composed of a non-clinical sample (i.e., Psychology students and individuals from the general community) and a clinical sample

(participants recruited from two mental health units). Cebolla and colleagues tested three different models: a unidimensional structure, a hierarchical model (all five factors are intercorrelated and indicators of an overarching mindfulness factor) and a four-factor model (the factors Describing, Awareness, Nonjudging, and Nonreactivity are correlated with a second order factor, while Observing remained isolated). The third model showed the best fit indices.

The other published study was performed with a sample of 285 Argentinian adults with a mean age of 43 years and an age range of 22-74 years participating in a mindfulness training activity (Anchorena et al., 2017). Specifically, the authors conducted an Exploratory Factor Analysis and, after deleting 17 items with factorial loadings lower than .50 and/or a difference lower than .20 between the two highest factor loadings, retained 22 items that were organized in a 4-factor structure (i.e., observing, describing, awareness, and non-judging). This 22-item 4-factor model was then confirmed with the same sample of participants via Confirmatory Factor Analyses (CFA). The different analytical approaches (i.e., CFA with parcels vs. EFA deleting items), and the fact that the 22-item 4-factor solution was replicated in the same sample rather than in an independent Argentinian sample, suggest that further research about the psychometric properties of the Spanish FFMQ version in Argentinian population is needed. In sum, there is limited evidence regarding model fit of the Spanish version when testing the four-correlated and the five-correlated models that were previously examined with the original English version (Baer et al., 2006). Thus, research is still needed to evaluate the FFMQ Spanish version, as prior studies in Spain and Argentina did not conduct all the possible models tested with the original English version.

The present study aimed to identify the best-fitting factor structure of the FFMQ, proposed and examined with the original English version in different samples of college

students (Baer et al., 2006), in a sample of Argentinian college students with and without prior mindfulness experience. Additionally, we examined whether the best fitting model was invariant across sexes and mindfulness experience. Specifically, we tested configural (equivalence of model form), metric (equivalence of factor loadings) and scalar invariance (equivalence of item intercepts; Putnick & Bornstein, 2016). We also examined concurrent validity evidence of the FFMQ by analyzing the association between the mindfulness dimensions and symptoms of depression, anxiety and stress, facets of anxiety sensitivity, and emotion regulation strategies.

Method

Participants

Participants (n = 632) were college students from five public universities from three cities in Argentina (i.e., one university from Bahia Blanca, two from Cordoba and two from Ciudad Autonoma de Buenos Aires [CABA; *Autonomous City of Buenos Aires*]). Inclusion criteria included being enrolled in at least one of the five targeted public universities. These public universities were arbitrarily chosen attempting to reach a diverse sample of college students. Public universities in Argentina, particularly those in the two biggest cities of Argentina (Cordoba and CABA), attract a majority of students from families of medium or high socioeconomic status (approximately 80%) and a lower percentage of students from families of low socio-economical level (Bringiotti & Raffo, 2010). In Argentina, students are usually enrolled in the university closest to home; therefore, these universities mainly attract students from the central region and, to a lesser extent, from the northwestern, northeast and southern regions of Argentina.

A total of 378 cases were excluded for the following reasons: 1) only provided socio-demographic information (n = 17), 2) were enrolled in universities not targeted in the present study (n = 44), 3) were duplicated responses (n = 34), 4) scored lower than

75% in the attention check questions ($n = 28$), 5) were not college students (dropped out of college or already graduated; $n = 80$), or 6) did not complete the FFMQ ($n = 175$). After excluding these cases, the final analytic sample comprised of 632 participants. The mean age of the sample was 24.47 (SD = 5.76; age range 17-60). Among the analytic sample, the majority identified as female (69.1%), whereas 30.5% identified as male and 0.3% did not answer. Around half of the sample (56.6%) attended college in CABA, 7.3% in Bahia Blanca, and 35.9% in Cordoba. There was an even distribution across year in school (20.6% freshman, 15.3% sophomore, 21.7% junior, 13.8% senior and 28% fifth/sixth or seventh year of college). The mean of perceived socioeconomic status (from 1 = *very poor* to 10 = *wealthy*) was 5.87 (SD = 1.67).

Procedure

An invitation to participate in the study was disseminated through online social networks (i.e., Instagram, Facebook and Twitter), and e-mail listings with contact information of participants from previous studies that had expressed their willingness to be invited in future studies. The invitation asked for college students to participate in a study on substance use and mindfulness. The online survey (LimeSurvey) explained the general aim of the study and provided contact information of the researchers. The confidentiality of the participants and the voluntary participation were emphasized. Participants provided informed consent by clicking on the *next* button. Attention checks (e.g., for this statement, please select the option *strongly agree*) were included in the survey to ensure that participants were reading and understanding the survey. No identifiable information was collected; however, email addresses were requested to identify duplicates and to inform participants if they won one of the prizes. Participants did not receive any compensation or course credit for their participation; however, those who completed the survey were eligible for a raffle of two cash prizes (each equivalent

to ≈17 US Dollars at the moment of data collection) and 15 gift cards to use in a bookstore (each equivalent to ≈8.5 US Dollars at the moment of data collection). The survey provided electronic prompts for each missing response. Completing the online survey took ~35 minutes. Data were gathered between April and June 2020. All the procedures were approved by the institutional review board of the participating university.

Measures

For all psychometric measures, composite scores were created by averaging items such that higher scores indicate higher levels of the construct.

Mindfulness experience.

Participants reported whether they had previous or current experience with mindfulness (*Do you have any previous or current experience with mindfulness meditation?*). If participants responded "yes", they were branched to an additional question: "How often (from 1 = *longer than a year since I last meditated* to 11 = *daily, more than once per day*) do you practice mindfulness meditation currently?

Five Facets of Mindfulness.

We used the Spanish version (Cebolla et al., 2012) of the FFMQ (Baer et al., 2006). The FFMQ is a 39-item self-report measure that assesses the tendency to be mindful in daily life (e.g., *"I'm good at finding the words to describe my feelings"*) with five dimensions: Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience. All dimensions but Nonreactivity (7 items) have eight items that are rated on a 5-point Likert scale (from 1 = *never or very rarely true* to 5 = *very often or always true*). To guarantee content correspondence with the original English version, we slightly modified the language of two items of the Spanish version (Cebolla et al., 2012) to fully resemble the content of the original English version ("*I pay attention to sensations, such as the wind in my hair of sun on my face*"

and "*It seems I am 'running on automatic' without much awareness of what I'm doing*").

Specifically, the item "*Presto atención a las sensaciones que produce el viento en el pelo o el sol en la cara*" was modified to "*Presto atención a las sensaciones que produce el viento en mi pelo o el sol en mi cara*" and the item "*Conduzco en 'piloto automático', sin prestar atención a lo que hago*" was modified to "*Parece que funciono con el 'piloto automático', sin prestar atención a lo que hago*". All these tasks were performed by three bilingual researchers in the context of a different, cross-cultural, study.

Emotion regulation strategies.

We used the Spanish version (Cabello et al., 2013) of the Emotional Regulation Questionnaire (ERQ; Gross & John, 2003). This 2-dimension self-report measure assesses cognitive reappraisal (6 items; e.g., "*When I want to feel more positive emotion, I change the way I'm thinking about the situation*") and expressive suppression (4 items; e.g., "*I control my emotions by not expressing them*"). Participants reported their level of agreement with each statement using a 7-point Likert scale (from 1 = *strongly disagree* to 7 = *strongly agree*). The ERQ presented adequate values of internal consistency both in the Spanish adaptation ($\alpha = 0.79$ for reappraisal and $\alpha = 0.75$ for suppression) and in the present work ([$\alpha = 0.81$; $\omega = 0.81$] for reappraisal and [$\alpha = 0.79$; $\omega = 0.81$] for suppression).

Depression, anxiety and stress symptoms.

The Spanish version (Daza et al., 2002) of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used to assess emotional states of depression, anxiety and stress. The scale includes 21 items grouped in three subscales (7 items each): depression (e.g., "*I felt that I had nothing to look forward to*"), anxiety (e.g., "*I was aware of dryness of my mouth*") and stress (e.g., "*I found myself getting agitated*") that are based on a dimensional rather than a categorical conception of psychological

disorder. Participants reported how much each statement applied to them over the previous week (from 0 = *did not apply to me at all* to 3 = *applied to me very much or most of the time*). The DASS-21 featured adequate reliability indexes both in the present study ([between α = 0.78 and α = 0.88] and [between ω = 0.79 and ω = 0.88] for the subscales) and in the Spanish adaptation (between α = 0.86 and α = 0.93 for the subscales).

Anxiety sensitivity index.

The Spanish version (Sandín et al., 2007) of the Anxiety Sensitivity Index ([ASI-3]; Taylor et al., 2007) was used to assess anxiety sensitivity (which is defined as the fear of the sensations and behaviors associated with anxiety; Sandín et al., 1996). This is a self-report measure that includes 18 items grouped in three subscales relating to fears of Physical (e.g., "*When my stomach is upset, I worry that I might be seriously ill*"), Cognitive (e.g., "*When my thoughts seem to speed up, I worry that I might be going crazy*"), and Social Concerns (e.g., "*It scares me when I blush in front of people*"). Participants reported how much each statement described them (from 0 = *very little* to 4 = *very much*). The ASI-3 had adequate internal consistency both in the Spanish adaptation (between α = 0.83 and α = 0.87 for the three subscales) and in the present study ([between = 0.80 and α = 0.84] and [ω = 0.80 and ω = 0.86] for the three subscales).

Data Analysis

Structure validity evidence.

Five CFAs were conducted to examine the factor structure of the Spanish FFMQ. We used maximum likelihood estimation with robust standard errors (i.e., MLR) in *Mplus* (version 8.4). Different indices of goodness of fit were examined for each proposed factorial structure: Chi square, the root mean square error of approximation (RMSEA), the Tucker-Lewis index (TLI), and the Comparative Fit Index (CFI). A nonsignificant Chi-square value indicates an acceptable fit; however, considering this index is highly

sensitive to sample size, the remaining indices of fit were considered. For RMSEA, values between 0 and 0.05 and between 0.05 and 0.08 denotes good or acceptable fit, respectively. For CFI and TLI, values greater than 0.90 or greater than 0.95 are usually indicative of acceptable and strong fit, respectively (Hu & Bentler, 1995). As a first step, parcels of items were created for each factor (Baer et al., 2006; Cebolla et al., 2012) using the item-to- construct-balance approach (Little et al., 2002; e.g., adding two items, one with a high factor loading and another with a low factor loading). As Nonreactivity has seven items, three 2-item parcels were created plus one parcel with one item. This yielded a total of 20 parcels (4 parcels per factor).

We tested a one-factor model where all parcels load onto one overall factor or dimension (Model A). A second model was a five-factor correlated model in which parcels load on their individual subscale factor (Model B). Then we tested a hierarchical model where all five factors are intercorrelated and indicators of an overarching mindfulness factor (Model C). Then, we tested a four-factor model where the parcels load on their individual subscale factor (i.e., Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience) and Observing was not included in the model (Model D). Finally, we tested a hierarchical model where the same four intercorrelated factors from Model D were themselves indicators of an overall mindfulness factor (Model E).

Measurement invariance.

We then conducted multiple-group confirmatory factor analyses (MG-CFAs) with MLR estimator to determine whether the best fitting model was invariant across mindfulness experience (with versus without mindfulness experience) and sex (female versus male). We examined three different measurement invariance levels: configural, metric and scalar invariance. Configural invariance tests whether the items load on the

proposed factor, metric invariance (which is necessary to examine associations across groups) tests whether the item-factor loadings are similar across groups, and scalar invariance (which is needed to allow mean comparisons across groups) tests whether the unstandardized item intercepts are similar across groups. The χ^2 difference tests compare a freely estimated multiple-group model to a constrained multiple-group model. A model is interpreted as not invariant if constraining the paths to be equivalent results in a worst fitting model. Since the χ^2 test statistic is sensitive to sample size (Brown, 2015), we relied on other model comparison criteria. Specifically, we used ΔCFI/ΔTFI $\geq$ 0.010 (decrease indicates worse fit; Cheung & Rensvold, 2002) and ΔRMSEA $\geq$ 0.015 (increase indicates worse fit; Chen, 2007) to determine significant decrement in model fit (i.e., invariance is not meet) when testing for measurement invariance. For ΔCFI/ΔTFI and ΔRMSEA, which are indices with very small cut-off values, we exceptionally used three decimal places to report results.

Group differences analyses.

We conducted independent samples t-tests to evaluate differences on each dimension of mindfulness (i.e., averaged means) as a function of lifetime experience with mindfulness (yes, no) and sex (male, female).

Reliability.

Internal consistency of the scores corresponding to each of the five dimensions of the FFMQ was calculated through the composite reliability analysis (ω) and Cronbach Alpha (α). Reliability values were considered as acceptable and satisfactory when equal or greater than 0.70 or equal or greater than 0.80, respectively (Hogan, 2004).

Concurrent validity evidence.

We conducted bivariate correlation analyses to examine the relationship between mindfulness dimensions and theoretically relevant variables. Specifically, we examined

the correlation of each FFMQ subscale with emotion regulation strategies, subscales of the Anxiety Sensitivity Index, and symptoms of depression, anxiety and stress in the total sample and across sexes and mindfulness experience. Correlations of 0.10, 0.30 and 0.50 were considered small, moderate and large respectively (Cohen, 1992).

Results

Mindfulness experience

Participants with lifetime mindfulness experience represented 29.7% (n = 188) of the sample. Among these participants, 22.9% indicated more than a year from the last mindfulness activity, 26% endorsed practicing between once and eleven times a year, 17.6% between once and three times a month, and 33.6% between once a week and more than once per day.

Structure validity evidence

Five CFA models were examined. Model A (i.e., one factor model) showed poor fit to the data based on all indices. Model B (five intercorrelated factors) showed acceptable fit to the data (based on CFI, TLI and RMSEA). Model C (five intercorrelated factors in a hierarchical model) showed acceptable fit based on one index (CFI) and non-acceptable fit based on the remaining indices. Model D (four intercorrelated factors in a hierarchical model) showed acceptable fit (with values highly similar to Model B) while Model E (four intercorrelated factors in a hierarchical model) showed adequate fit. These results are presented in Table 1. Indices of model fit for models B, D and E were highly similar. Based on these findings, and considering that the five intercorrelated model captures all identified dimensions of mindfulness, Model B was retained.

[please, insert Table 1 around here]

In Model B, all parcels loaded significantly on their hypothesized factor and all standardized loadings were salient (i.e., ≥ 0.35; Brown 2015). Specifically, standardized

factor loadings for Observe ranged between 0.70 and 0.73; for Describe ranged between 0.78 and 0.86; for Aware ranged between 0.76 and 0.86; for Nonjudge ranged between 0.81 and 0.84 and for Nonreact ranged between 0.62 and 0.73. All standardized loadings are presented in Figure 1 and Supplementary Table 1.

[please, insert Figure 1 around here]

Measurement Invariance.

Based on the previous findings, we conducted multiple-group confirmatory factor analyses to examine whether the Model B (i.e., the best fitting model) was invariant across mindfulness status (with versus without mindfulness experience) and sex (female versus male).

Mindfulness experience. The majority of the indices (CFI = 0.95, TLI = 0.94, RMSEA = 0.06 (90% CI [0.05, 0.06])) supported configural invariance of the model across groups with or without mindfulness experience. Additionally, most indices (CFI = 0.95, TLI = 0.94, RMSEA = 0.05 (90% CI [0.05, 0.06])) and the minimal change on these values (ΔCFI = 0.000; ΔTLI = -.003; ΔRMSEA = 0.001) also supported metric invariance of the model. Finally, scalar invariance was met based on most indices of model fit (CFI = 0.94, TLI = 0.93, RMSEA = 0.06 (90% CI [0.05, 0.06])) alongside the minimal change on these fit indices (ΔCFI = 0.008; ΔTLI = 0.006; ΔRMSEA = -0.003).

Sex. Most indices (CFI = 0.95, TLI = 0.94, RMSEA = 0.06 (90% CI [0.05, 0.06])) supported configural invariance of the model across sex. The metric invariance model also showed acceptable fit to the data based on most indices (CFI = 0.95, TLI = 0.94, RMSEA = 0.05 (90% CI [0.05, 0.06])) and the minimal change on fit indices (ΔCFI = -0.001; ΔTLI = -0.004; ΔRMSEA = 0.002). Scalar invariance was supported based on the majority of indices of model fit (CFI = 0.94, TLI = 0.94, RMSEA = 0.06 (90% CI [0.05,

0.06])) and the minimal change on fit indices (ΔCFI = 0.006; ΔTFI = 0.004; ΔRMSEA = -0.002).

Group differences

Participants with lifetime mindfulness experience, compared to those that have never practiced mindfulness, scored significantly higher (p < 0.05) in three dimensions of the Spanish FFMQ: Observing (Mean = 3.38 [SD = 0.78] versus Mean = 2.91 [SD = 0.80]; t (630) = 6.74; Cohen's d = 0.54), Describing (Mean = 3.50 [SD = 0.88] versus Mean = 3.22[SD = 0.86]; t (630) = 3.75; Cohen's d = 0.30) and Nonreactivity to Inner Experience (Mean = 3.05 [SD = 0.71] versus Mean = 2.89 [SD = 0.73]; t (630) = 2.64; Cohen's d = 0.21). For Acting with Awareness, those without mindfulness experience scored significantly higher than participants with experience in mindfulness (Mean = 3.42 [SD = 0.87] versus Mean = 3.10 [SD = 0.88]; t (630) = 4.22; Cohen's d = 0.34). Group differences (with vs without mindfulness experience) for Nonjudging of Inner Experience were not significant (Mean = 3.24 [SD = 0.91] versus Mean = 3.24 [SD = 0.93]; t (630) = .02; Cohen's d = 0.00).

Males, compared to females, scored significantly higher (p < 0.05) in Acting with Awareness (Mean = 3.46 [SD = 0.84] versus Mean = 3.26 [SD = 0.90]; t (628) = 2.65; Cohen's d = 0.21), and Nonjudging of Inner Experience (Mean = 3.38 [SD = 0.93] versus Mean = 3.18 [SD = 0.91]; t (628) = 2.51; Cohen's d = 0.20). For Observing, females scored significantly higher than males (Mean = 3.13 [SD = 0.80] versus Mean = 2.87 [SD = 0.83]; t (628) = 3.63; Cohen's d = 0.29). Group differences (males vs females) for Describing (Mean = 3.29 [SD = 0.88] versus Mean = 3.31 [SD = 0.87]; t (628) = .27; Cohen's d = 0.02) and Nonreactivity to Inner Experience (Mean = 2.98 [SD = 0.80] versus Mean = 2.92 [SD = 0.69]; t (628) = 1.10; Cohen's d = 0.09) were not significant.

Reliability

The five scales of the FFMQ showed satisfactory internal consistency based on both indexes (i.e., Omega and Cronbach). These results are presented in Table 2.

Concurrent validity evidence

Table 2 shows the results of the correlations between the dimensions of mindfulness and theoretically relevant variables in the total sample. Most of the correlations of FFMQ subscales were negative and significant with symptoms of depression, anxiety and stress, facets of anxiety sensitivity and suppression emotion regulation strategies; while they were positive and significant with reappraisal strategies. We observed medium to high-sized correlations for Describing, Acting with Awareness and Nonjudging of Inner Experience. The strongest correlations were observed between these facets and symptoms of depression. Nonreactivity to Inner Experience and Observing showed small-sized correlations. Moreover, Observing was not significantly correlated with facets of anxiety sensitivity and symptoms of depression.

[please, insert Table 2 around here]

Tables 3 and 4 show correlations between dimensions of mindfulness and theoretically relevant variables across sex and mindfulness experience. Most of the correlations were stronger in females versus males and in people with mindfulness experience versus those who never practiced this activity. We compared the magnitude of the correlations across sex and across mindfulness experience to examine whether mindfulness dimensions were differentially related to theoretically relevant variables across groups. To do this, we calculated the average differences in correlations and interpreted the magnitude of the correlation differences following these criteria: less than 1 SD small, 1 *SD* to 2 *SD* medium, 2 *SD* to 3 *SD* large, and >3 *SD* substantial. For female and male correlations, the average difference of 50 possible comparisons was 0.11 (*SD* = 0.07). We found one substantial correlation difference: the correlation between

Nonjudging and reappraisal emotion regulation strategies was positive significant and small ($r = 0.19$; $p < 0.05$) for females but it was negative no significant and small ($r = -0.13$; $p = 0.10$) for males (see Table 3). For correlations across participants with mindfulness experience and without mindfulness experience, the average difference of 50 possible comparisons was 0.09 ($SD = 0.06$). One substantial correlation appeared: the correlation between Nonreactivity and reappraisal emotion regulation strategies was positive and moderate ($r = 0.40$; $p < 0.05$) for students with mindfulness experience but it was positive and small ($r = 0.14$; $p < 0.05$) for participants without mindfulness experience (see Table 4).

[please, insert Tables 3 and 4 around here]

Discussion

The present study aimed at establishing the psychometric properties of a Spanish version of the 39-item FFMQ, a self-report measure to assess mindfulness-related traits, in a sample of Argentinian college students. Although psychometric work of the Spanish FFMQ was previously conducted in Argentina and Spain, evidence concerning the evaluation of the different models proposed by Baer et al. (2006) was scarce. To accomplish this aim, we tested different models that were examined with the original English version (Baer et al., 2006). Overall, our findings supported the 5-factor correlated model and suggested that this Spanish version efficiently measures mindfulness-related traits in Argentinian college students with and without lifetime mindfulness experience. Notably, this model was invariant across sex and mindfulness experience. Measurement invariance, or test equivalence, of a psychological instrument means the instrument assesses an unobserved construct in the same way across groups (e.g., male and female groups; International Test Commission, 2018; Schmitt et al., 2010). Specifically, and considering the three levels of measurement invariance, configural invariance means that

items load on the same factor across groups. Metric invariance means the factor loadings (i.e., the strength of the relations between items and factors) are equivalent across groups and, when metric invariance is found, relations between those constructs and other constructs can be compared across groups. Finally, to meaningfully compare the means across groups, is necessary to meet scalar invariance (i.e., the intercepts associated with item-factor relations are equal across comparison groups). Therefore, measurement invariance is a central issue in psychological assessment because, unless measurement invariance is met, it is not possible to meaningfully compare correlations and means across groups (International Test Commission, 2018; Schmitt et al., 2010).

Past research has provided inconsistent findings regarding the underlying structure of the 39-item FFMQ with some studies supporting both a 5-factor intercorrelated and a 5-factor hierarchical model as a better fit to the data (Baer et al., 2006; Christopher et al., 2012; Giovannini et al., 2014; Hou et al., 2014; Okafor et al., 2022); while others suggest that 4-factor models (both, intercorrelated and/or hierarchical but exclude the observing facet) provide better fit to the data (Baer et al., 2006; Heeren et al., 2011; Sugiura et al., 2012; Williams et al., 2014). Methodological issues have been mentioned as a probable explanation for these discrepancies. For instance, Van Dam et al. (2012) stated that different item wording (i.e., negative [*I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted*] and positive direction [*It is easy for me to concentrate on what I'm doing*]) within the FFMQ could generate a response pattern that translates into an unclear factor structure. This could be particularly insidious when the sample exhibits differences in mindfulness experience as individuals with no experience are more susceptible to this type of method effect (Van Dam et al., 2012). Further, in supporting that actual or past mindfulness experience could influence self-reported responses, and in turn, the underlying structure of the items, Baer

et al. (2006) found that a 5-factor hierarchical model presented an adequate fit in a sample of college students with some experience with mindfulness. However, in a sample of students with relatively no past experience with mindfulness, this model was misspecified (i.e., loadings for the Observe dimension on the overall factor were non-significant).

Our findings, tested in a sample of participants with no or some experience of mindfulness, showed that the five-factor or the four-factor correlated models fit the data better than their corresponding hierarchical models (although our four-factor hierarchical model showed adequate fit to the data), in line with results found in samples with no or limited experience with mindfulness (e.g., Baer et al., 2006; de Bruin et al., 2012; Hou et al., 2014; Okafor et al., 2022; Tran et al., 2013; Van Dam et al., 2012).Notably, in the present study, the 5-factor hierarchical model showed adequate fit for some but not all fit indices. Altogether, these results suggest that, at least in samples of college students with diverse prior experiences with mindfulness, the model that proposes that each of the five dimensions represent distinct components rather than a conglomeration of components of an overarching mindfulness construct, shows better fit to the data. Although support for the 5-factor hierarchical model seem less strong than for the 5-factor correlated model, researchers advise not to interpret this as the lack of existence of a multifaceted construct with subsumed components (Van Dam et al., 2012). Rather, these findings suggest that data show better fit with the model that proposed distinct facets than a single hierarchical model.

Consistent with the majority of past research (e.g., Baer et al., 2006; Cebolla et al., 2012; Manotas et al. 2014; Williams et al., 2014), all five dimensions of the FFMQ exhibit adequate reliability (α between 0.77 and 0.89; ω between 0.78 and 0.89). Regarding the association between each of the FFMQ dimensions, our findings are highly similar to those reported by Cebolla et al. (2012), Baer et al. (2006) or Van Dam et al.

(2012). For instance, similar to past psychometric studies, the associations between the facets mostly range between low to medium size. Similar to Cebolla et al. (2012), Observing was negatively and significantly associated with Awareness and Non Judging; a finding that differed from other work where the association between Observing and Non Judging (Baer et al., 2006; Van Dam et al., 2012) and between Observing and Awareness (Van Dam et al., 2012) were negative but non-significant. Another difference between the present and these past studies is that we did not find a significant association between Non Reactivity and Non Judging. Overall, these findings suggest that, across studies, the most consistent finding is a positive and significant correlation between all facets but Observing (Rudkin et al., 2018). This facet, as already indicated, seems to behave differently, which is most likely related with the level of involvement in mindfulness activities (Baer et al., 2006). It is also possible that the facets of the FFMQ work differently across languages (i.e., English or Spanish). Future studies could test this possibility by examining measurement invariance across languages and/countries.

Regarding concurrent validity evidence, our findings showed that most facets of the FFMQ negatively significantly correlated with psychological symptoms (i.e., depression, anxiety, and stress, facets of anxiety sensitivity, and suppressed emotion regulation strategies) and positively significantly correlated with reappraisal emotion regulation strategies. These findings are consistent with past meta-analysis research (e.g., Carpenter et al., 2019; Karyadi et al., 2014) and support evidence of mindfulness as a set of skills that may be useful to reduce mental health problems (Fjorback et al., 2011; Galante et al., 2013; Hofmann et al., 2010). The Observing facet was not significantly correlated with facets of anxiety sensitivity and symptoms of depression in the total sample. In line with this, a meta-analysis found these associations were moderated by meditation experience such that negative and significant relationships between Observing

and affective symptoms were observed only in samples of meditation practitioners (Carpenter et al., 2019).

When analyzing the correlation differences across mindfulness experience, we only found three large and one moderate difference. Despite low in number, these found differences support past evidence showing mindfulness practice is strongly associated with an improvement in strategies of cognitive reappraisal (Garland et al., 2015; Hanley & Garland, 2014) and with a reduction of affective symptoms (Fjorback et al., 2011; Hofmann et al., 2010). The absence of larger magnitude differences in the relationships between theoretically relevant variables and mindfulness, particularly with Observing, could be associated with the pattern of mindfulness experience of the present sample. Noteworthy, in the present study, the majority of those who reported past experience with mindfulness seem to be infrequent meditators (e.g., around 30% reported practicing mindfulness once a year or less and almost 50% less than once a month). Additionally, when comparing the correlations between the subsample of females and males, we observed one large and one substantial difference involving cognitive reappraisal. These findings might be relevant input to examine the efficacy of adapted interventions to the different needs of female and male students (Brown et al., 2021; Vorontsova-Wenger et al., 2021).

Limitations and Future Directions

The present study has limitations. Due to the convenience sampling procedure, our findings may not generalize to other populations. Related to this, our sample was composed of college students with non or some experience with mindfulness. More investigation, with a more adequate representation of mindfulness experience (i.e., non-meditators, occasional, and regular meditators) is needed. Future studies would benefit from examining the psychometric properties of the Spanish version of the FFMQ in

samples comprising the general population or regular meditators. Moreover, future research should test for measurement invariance of the FFMQ across time and cultures, and provide criterion-related validity with other mental health problems such as addictive behaviors. Additionally, future studies should also evaluate other psychometric properties, such as test-retest reliability or convergent validity (with other trait mindfulness measures), of this Spanish version. This study represents a significant contribution to the field of mindfulness assessment. Our results provide evidence of reliability and validity of the FFMQ as an instrument to evaluate mindfulness dispositions in Argentinian college students.

Declarations

Conflict of Interest Statement

The authors report no conflict of interest.

Ethics Statement

All the procedures were approved by the institutional review board of the Institute of Psychological Research - National Council on Scientific and Technical Research and National University of Cordoba (IIPsi – CONICET and UNC), Argentina.

Informed Consent Statement

All participants provided informed consent to participate in the study.

Author Contributions

Pablo Correa: Data Management, Formal Analysis, Writing-Original Draft, Writing - Review & Editing, Visualization; Yanina Michelini: Conceptualization, Methodology, Validation, Investigation, Resources, Review & Editing, Supervision, Project Administration; Adrian J. Bravo: Conceptualization, Methodology, Validation, Review & Editing, Supervision; Laura Mezquita: Conceptualization, Methodology, Validation, Review & Editing, Supervision; Angelina Pilatti: Conceptualization,

Methodology, Validation, Investigation, Resources, Data Management, Formal analysis, Writing - Review & Editing, Visualization, Supervision, Project Administration, Funding Acquisition.

Data Availability Statement

Data are available from the corresponding author on request.

References

Aguado, J., Luciano, J. V., Cebolla, A., Serrano-Blanco, A., Soler, J., & García-Campayo, J. (2015). Bifactor analysis and construct validity of the Five Facet Mindfulness Questionnaire (FFMQ) in non-clinical Spanish samples. *Frontiers in Psychology*, *6*, 1-14. https://doi.org/10.3389/fpsyg.2015.00404

Anchorena, M. N., Ghiglione, F., & Nader, M. (2017). Psychometric properties of the Five Facet Mindfulness Questionnaire in an Argentine sample. *Archives of Assessment Psychology*, *7*(1), 29-41.

Arthur, D., Dizon, D., Jooste, K., Li, Z., Salvador, M., & Yao, X. (2018). Mindfulness in nursing students: The Five Facet Mindfulness Questionnaire in samples of nursing students in China, the Philippines, and South Africa. *International Journal of Mental Health Nursing*, *27*(3), 975-986. https://doi.org/10.1111/inm.1240

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The kentucky inventory of mindfulness skills. *Assessment*, *11*(3), 191–206. https://doi.org/10.1177/1073191104268029

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27–45. https://doi.org/10.1177/1073191105283504

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S… Williams, J. M. G. (2008). Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329–342. https://doi.org/10.1177/1073191107313003

Bayır, B., & Aylaz, R. (2020). The effect of mindfulness-based education given to individuals with substance-use disorder according to self-efficacy theory on self-

efficacy perception. *Applied nursing research: ANR*, 151354. Advance online publication. https://doi.org/10.1016/j.apnr.2020.151354

Bohlmeijer, E., ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the Five Facet Mindfulness Questionnaire in depressed adults and development of a short form. *Assessment*, *18*(3), 308-320. https://doi.org/10.1177/1073191111408231

Bravo, A. J., Lindsay, E. K., & Pearson, M. R. (2022). Nature, Assessment, and Mechanisms of Mindfulness. In *Handbook of Assessment in Mindfulness Research* (pp. 1-12). Springer International Publishing.

Bringiotti, M. I. & Raffo, P. E. (2010). Abuso sexual Infanto-Juvenil. Prevalencia y caracteristicas de estudiantes Universitarios de la Ciudad de Buenos Aires. *Revista de Derecho de Familia*, *46*, 293-305.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). Guilford Press.

Brown, M. M., Arigo, D., Wolever, R. Q., Smoski, M. J., Hall, M. H., Brantley, J. G., & Greeson, J. M. (2021). Do gender, anxiety, or sleep quality predict mindfulness-based stress reduction outcomes? *Journal of Health Psychology*, *26*(13), 2656–2662. https://doi.org/10.1177/1359105320931186

Brown, D. B., Bravo, A. J., Roos, C. R., Pearson, M. R. (2015). Five facets of mindfulness and psychological health: Evaluating a psychological model of the mechanisms of mindfulness. *Mindfulness*, *6*, 1021–1032. https://doi.org/10.1007/s12671-014-0349-4

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring Mindfulness in insight meditation and meditation-based psychotherapy: The development of the Freiburg Mindfulness Questionnaire (FMI). *Journal for Meditation and Meditation Research*, *1*(11), 11-34.

Cabello, R., Salguero, J. M., Fernández-Berrocal, P., & Gross, J. J. (2013). A Spanish adaptation of the Emotion Regulation Questionnaire. *European Journal of Psychological Assessment, 29*(4), 234-240. https://doi.org/10.1027/1015-5759/a000150

Carpenter, J. K., Conroy, K., Gomez, A. F., Curren, L. C., & Hofmann, S. G. (2019). The relationship between trait mindfulness and affective symptoms: A meta-analysis of the Five Facet Mindfulness Questionnaire (FFMQ). *Clinical Psychology Review*, *74*, 101785. https://doi.org/10.1016/j.cpr.2019.101785

Cebolla, A., García-Palacios, A., Soler, J., Guillen, V., Baños, R., & Botella, C. (2012). Psychometric properties of the 28panish validation of the Five Facets of Mindfulness Questionnaire (FFMQ). *The European Journal of Psychiatry*, *26*(2), 118-126. https://doi.org/10.4321/S0213-61632012000200005

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton mindfulness questionnaire (SMQ). *British Journal of Clinical Psychology*, *47*(4), 451-455. https://doi.org/10.1348/014466508X314891

Chen, F. F., 2007. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*, 464‑504. https://doi.org/10.1080/10705510701301834.

Cheung, G., Rensvold, R., 2002. Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233‑255. https://doi.org/10.1207/S15328007SEM0902_5

Christopher, M. S., Neuser, N. J., Michael, P. G., & Baitmangalkar, A. (2012). Exploring the psychometric properties of the Five Facet Mindfulness Questionnaire. *Mindfulness*, *3*, 124-131. https://doi.org/10.1007/s12671-011-0086-x

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155. https://doi.org/10.1037//0033-2909.112.1.155

Curtiss, J. & Klemanski, D. H. (2014). Factor analysis of the Five Facet Mindfulness Questionnaire in a heterogeneous clinical sample. *Journal of Psychopathology and Behavioral Assessment*, *36*, 683-694. https://doi.org/10.1007/s10862-014-9429-y

Daza, P., Novy, D. M., Stanley, M. A., & Averill, P. (2002). The depression anxiety stress scale-21: Spanish translation and validation with a Hispanic sample. Journal of *Psychopathology and Behavioral Assessment, 24*(3), 195-205. https://doi.org/10.1023/A:1016014818163

de Bruin, E. I., Topper, M., Muskens, J. G. A. M., Bögels, S. M., & Kamphuis, J. H. (2012). Psychometric properties of the Five Facets Mindfulness Questionnaire (FFMQ) in a meditating and a non-meditating sample. *Assessment*, *19*(2), 187-197. https://doi.org/10.1177/1073191112446654

Deng, Y., Liu, X., & Rodriguez, M. A. (2011). The Five Facet Mindfulness questionnaire: Psychometric properties of the Chinese versión. *Mindfulness*, *2*, 123-128. https://doi.org/10.1007/s12671-011-0050-9

Feldman, G. C., Hayes, A. M., Kumar, S., Greeson, J., & Laurenceau, J. P. (2007). Mindfulness and Emotion Regulation: The Development and Initial Validation of

the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment, 29*, 177-190. https://doi.org/10.1007/s10862-006-9035-8

Fjorback, L. O., Arendt, M., Ornbol, E., Fink, P., Walach, H. (2011). Mindfulness-based stress reduction and mindfulness-based cognitive therapy—a systematic review of randomized controlled trials. *Acta Psychiatrica Scandinavica*, *124*(2), 102–119. https://doi.org/10.1111/j.1600-0447.2011.01704.x

Galante, J., Iribarren, S. J., Pearce, P. F. (2013). Effects of mindfulness-based cognitive therapy on mental disorders: A systematic review and meta-analysis of randomised controlled trials. *Journal of research in nursing: JRN*, *18*(2), 133–155. https://doi.org/10.1177/1744987112466087

Garland, E. L., Hanley, A., Farb, N. A., & Froeliger, B. E. (2015). State Mindfulness During Meditation Predicts Enhanced Cognitive Reappraisal. *Mindfulness, 6*(2), 234–242. https://doi.org/10.1007/s12671-013-0250-6

Giovannini, C., Giromini, L., Bonalume, L., Tagini, A., Lang, M., & Amadei, G. (2014). The Italian Five Facet Mindfulness Questionnaire: A contribution to its validity and reliability. *Journal of Psychopathology and Behavioral Assessment*, *36*, 415-423. https://doi.org/10.1007/s10862-013-9403-0

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348. https://doi.org/10.1037/0022-3514.85.2.348

Gu, J., Strauss, C., Crane, C., Barnhoferet, T., Karl, A… & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive

therapy for people with recurrent depression. *Psychological Assessment*, *28*(7), 791-802. https://doi.org/10.1037/pas0000263

Hanley, A. W., & Garland, E. L. (2014). Dispositional Mindfulness Co-varies with Self-Reported Positive Reappraisal. *Personality and Individual Differences, 66*, 146–152. https://doi.org/10.1016/j.paid.2014.03.014

Heeren, A., Douilliez, C., Peschard, V., Debrauwere, L., & Philippot, P. (2011). Cross-cultural validity of the Five Facets Mindfulness Questionnaire: Adaptation and validation in a French-speaking sample. *European Review of Applied Psychology*, *61*(3), 147-151. https://doi.org/10.1016/j.erap.2011.02.001

Hofmann, S. G., Sawyer, A. T., Witt, A. A., Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *78*(2), 169–183. https://doi.org/10.1037/a0018555

Hogan, T. (2004). *Intereses y actitudes*. Pruebas psicológicas: Una introducción práctica. Manual Moderno.

Hou, J., Wong, S. Y-S., Lo, H. H-M., Mak, W. W-S., Ma, H. S-W. (2014). Validation of a Chinese version of the Five Facet Mindfulness Questionnaire in Hong Kong and development of a short form. *Assessment*, *21*(3), 363-371. https://doi.org/10.1177/1073191113485121

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues and application* (pp. 77-99). Sage.

International Test Commission. (2018). *ITC Guidelines for the Large-Scale Assessment of Linguistically and Culturally Diverse Populations*. https://www.intestcom.org/files/guideline_diverse_populations.pdf

Karyadi, K. A., VanderVeen, J. D., & Cyders, M. A. (2014). A meta-analysis of the relationship between trait mindfulness and substance use behaviors. *Drug and Alcohol Dependence, 143*, 1–10. https://doi.org/10.1016/j.drugalcdep.2014.07.014

Khoury, B., Lecomte. T., Fortin, G., Masse, M., Therien, P…, & Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, *33*, 763–771. https://doi.org/10.1016/j.cpr.2013.05.005

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*, 151-173. doi: 10.1207/S15328007SEM0902_1

Lovibond, S. H., & Lovinbond, P. F. (1995). *Manual for the Depression Anxiety Stress Scale*. The Psychological Fundation of Autralia.

Manotas, M., Segura, C., Eraso, M., Oggins, J. (2014). Association of brief mindfulness training with reductions in perceived stress and distress in Colombian health care professionals. *International Journal of Stress Management*, *21*(2), 207-225. https://doi.org/10.1037/a0035150

Mandal, S. P., Arya, Y. K., & Pandey, R. (2016). Validation of the factor structure of the five facet mindfulness questionnaire. *Indian Journal of Health and Wellbeing*, *7*(1), 61-66.

Okafor, G. N., Ford, B. Q., Antonoplis, S., Reyna, A., Lutfeali, S., & Shallcross, A. (2022). *Measuring mindfulness in Black Americans: A psychometric validation of the Five Facet Mindfulness Questionnaire.* https://assets.researchsquare.com/files/rs1325638/v1_covered.pdf?c=1647369866

Pearson, M. R., Brown, D. B., Bravo, A. J., & Witkiewitz, K. (2015). Staying in the moment and finding purpose: The associations of trait mindfulness, decentering, and purpose in life with depressive symptoms, anxiety symptoms, and alcohol-related problems. *Mindfulness*, *6*(3), 645–653. https://doi.org/10.1007/s12671-014-0300-8

Putnick, D. L., & Bornstein, M. H. (2016). Measurement Invariance Conventions and Reporting: The State of the Art and Future Directions for Psychological Research. *Developmental Review, 41*, 71–90. https://doi.org/10.1016/j.dr.2016.06.004

Rudkin, E., Medvedev, O. N., & Siegert, R. J. (2018). The five-facet mindfulness questionnaire: why the observing subscale does not predict psychological symptoms. *Mindfulness, 9*(1), 230-242. https://doi.org/10.1007/s12671-017-0766-2

Sandín, B., Chorot, P., & McNally, R. J. (1996). Validation of the spanish version of the Anxiety Sensitivity Index in a clinical sample. *Behaviour Research and Therapy*, *34*(3), 283–290. https://doi.org/10.1016/0005-7967(95)00074-7

Sandín, B., Valiente, R. M., Chorot, P., & Santed, M. A. (2007). ASI-3: Nueva escala para la evaluación de la sensibilidad a la ansiedad [ASI-3: A new scale for the assessment of anxiety sensitivity]. *Revista de Psicopatología y Psicología Clínica*, *12*(2), 91–104.

Schmidt, C., & Vinet, E. V. (2015). Atención plena: validación del five facet mindfulness questionnaire (FFMQ) en estudiantes universitarios chilenos. *Terapia Psicológica*, *33*(2), 93–102. https://doi.org/10.4067/S0718-48082015000200004

Schmitt, N., Golubovich, J., & Leong, F. T. L. (2010). Impact of Measurement Invariance on Construct Correlations, Mean Differences, and Relations with External

Correlates. *Assessment,* *18*(4), 412–427. https://doi.org/10.1177/1073191110373223

Sugiura, Y., Sato, A., Ito, Y., Murakami, H. (2012). Development and validation of the Japanese version of the Five Facet Mindfulness Questionnaire. *Mindfulness*, *3*, 85-94. https://doi.org/10.1007/s12671-011-0082-1

Sweeney, T., Morriss, R., Nixon, E., Guo, B., & Callaghan, P. (2021). Psychometric properties of the Five Facets Mindfulness Questionnaire in moderate-to-severe, persistent depression. *Mindfulness*, *12*, 1009-1021. https://doi.org/10.1007/s12671-020-01573-6

Taylor, N. Z. & Millear, P. M. R. (2016). Validity of the Five Facet Mindfulness Questionnaire in an Australian, meditating, demographically diverse sample. *Personality and Individual Differences*, *90*, 73-77. https://doi.org/10.1016/j.paid.2015.10.041

Taylor, S., Zvolensky, M. J., Cox, B. J., Deacon, B., Heimberg, R. G…, & Cardenas, S. J. (2007). Robust dimensions of anxiety sensitivity: development and initial validation of the Anxiety Sensitivity Index-3. *Psychological Assessment*, *19*(2), 176–188. https://doi.org/10.1037/1040-3590.19.2.176

Tran, U. S., Gluck, T. M., & Nader, I. W. (2013). Investigating the Five Facet Mindfulness Questionnaire (FFMQ): Construction of a short form and evidence of a two-factor higher order structure of mindfulness. *Journal of Clinical Psychology*, *69*(9), 951-965. https://doi.org/10.1002/jclp.21996

Van Dam, N. T., Earleywine, M., & Danoff-Burg, S. (2012). Differential item function across meditators and non-meditators on the Five Facet Mindfulness Questionnaire. *Personality and Individual Differences*, *47*, 516-521. https://doi.org/10.1016/j.paid.2009.05.005

Veehof, M. M., ten Klooster, P. M., Taal, E., Westerhof, G. J., & Bohlmeijer, E. T. (2011). Psychometric properties of the Dutch Five Facet Mindfulness Questionnaire (FFMQ) in patients with fibromyalgia. *Clinical Rheumatology*, *30*(8), 1045–1054. https://doi.org/10.1007/s10067-011-1690-9

Vorontsova-Wenger, O., Ghisletta, P., Ababkov, V., & Barisnikov, K. (2021). Relationship Between Mindfulness, Psychopathological Symptoms, and Academic Performance in University Students. *Psychological Reports*, *124*(2), 459–478. https://doi.org/10.1177/0033294119899906

Williams, M. J., Dalgleish, T., Karl, A., & Kuyken, W. (2014). Examining the factor structures of the Five Facet Mindfulness Questionnaire and the Self-Compassion Scale. *Psychological Assessment*, *26*(2), 407-418. https://doi.org/10.1037/a0035566

Table 1.

Confirmatory factor analysis fit results for models of the Five Facet Mindfulness Questionnaire.

Model	CFI	TLI	RMSEA	X^2	$_{sb}X^2$
A. One factor	0.32	0.24	0.19 (0.19 - 0.20)	4153.27[*]	
B. Five factors intercorrelated	0.95	0.94	0.06 (0.05 - 0.06)	478.72[*]	
C. Five factors intercorrelated - hierarchical	0.90	0.88	0.08 (0.07 - 0.08)	764.51[*]	
D. Four factors intercorrelated	0.96	0.95	0.06 (0.05 - 0.06)	295.15[*]	183.52[*] [1]
E. Four factors intercorrelated - hierarchical	0.95	0.94	0.06 (0.06 - 0.07)	353.23[*]	433.65[*] [2]

Note. RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker–Lewis Index. Chi-square difference tests were conducted to compare $_{sb}X^2$ = Sattora-Bentler Scaled Chi-Square Difference. Five factors intercorrelated - hierarchical = model with all five facets loading on the overall mindfulness factor. Four factors intercorrelated - hierarchical = model with all five facets except observing loaded on the overall mindfulness factor.

[*] $p < 0.001$

[1] Chi-square difference test result comparing *Four factors intercorrelated* model vs *Five factors intercorrelated* model.

[2] Chi-square difference test result comparing *Four factors intercorrelated - hierarchical* model vs *Five factors intercorrelated - hierarchical* model.

Table 2.

Bivariate correlations and descriptive statistics among study variables in total sample.

	FFMQ Observing	FFMQ Describing	FFMQ Awareness	FFMQ Nonjudging	FFMQ Nonreactivity	M	SD	α	ω
FFMQ Observing						3.05	0.82	0.80	0.80
FFMQ Describing	0.24*					3.30	0.87	0.89	0.89
FFMQ Awareness	-0.13*	0.32*				3.32	0.88	0.89	0.89
FFMQ Nonjudging	-0.20*	0.22*	0.48*			3.24	0.92	0.89	0.89
FFMQ Nonreactivity	0.40*	0.35*	0.08*	0.04		2.94	0.73	0.77	0.78
DASS Total	0.12*	-0.33*	-0.54*	-0.56*	-0.19*	0.93	0.58		
DASS Depression	0.03	-0.38*	-0.48*	-0.53*	-0.17*	0.90	0.74		
DASS Anxiety	0.19*	-0.23*	-0.43*	-0.41*	-0.14*	0.68	0.62		
DASS Stress	0.11*	-0.24*	-0.49*	-0.49*	-0.16*	1.21	0.67		
ERQ Reappraisal	0.20*	0.19*	0.12*	0.08	0.22*	4.86	1.15		
ERQ Supression	-0.15*	-0.52*	-0.32*	-0.31*	-0.15*	3.73	1.42		
ASI-3 Total	0.05	-0.30*	-0.47*	-0.43*	-0.11*	1.00	0.70		
ASI-3 Physical	0.03	-0.17*	-0.26*	-0.25*	-0.06	0.88	0.81		
ASI-3 Cognitive	0.07	-0.27*	-0.50*	-0.45*	-0.12*	0.75	0.82		
ASI-3 Social Concerns	0.02	-0.30*	-0.40*	-0.36*	-0.10*	1.36	0.91		

Note. * Significant correlations (p < 0.05). FFMQ = Five Facet Mindfulness Questionnaire; DASS = Depression Anxiety Stress Scale; ERQ = Emotion Regulation Questionnaire; ASI-3 = Anxiety Sensitivity Index-3.

Table 3.

Bivariate correlation differences among study variables across sex between the FFMQ subscales and criterion variables.

	FFMQ Observing	FFMQ Describing	FFMQ Awareness	FFMQ Nonjudging	FFMQ Nonreactivity
Female (n = 437)					
DASS Total	0.08	-0.33*	-0.57*	-0.59*	-0.25*
DASS Depression	-0.02	-0.38*	-0.53*	-0.58*	-0.24*
DASS Anxiety	0.16*	-0.23*	-0.44*	-0.46*	-0.19*
DASS Stress	0.08	-0.23*	-0.49*	-0.46*	-0.21*
ERQ Reappraisal	0.19*	0.28*	0.18*	0.19*	0.30*
ERQ Supression	-0.17*	-0.55*	-0.37*	-0.30*	-0.17*
ASI-3 Total	0.01	-0.32*	-0.52*	-0.45*	-0.16*
ASI-3 Physical	0.00	-0.18*	-0.30*	-0.26*	-0.09
ASI-3 Cognitive	0.05	-0.29*	-0.54*	-0.50*	-0.17*
ASI-3 Social Concerns	-0.03	-0.30*	-0.43*	-0.36*	-0.14*
Male (n = 193)					
DASS Total	0.16*	-0.35*	-0.48*	-0.49*	-0.05
DASS Depression	0.12	-0.37*	-0.37*	-0.43*	-0.05
DASS Anxiety	0.22*	-0.24*	-0.41*	-0.28*	-0.02
DASS Stress	0.11	-0.30*	-0.48*	-0.54*	-0.06
ERQ Reappraisal	0.21*	-0.02	0.03	-0.13	0.09
ERQ Supression	-0.05	-0.46*	-0.27*	-0.40*	-0.14
ASI-3 Total	0.09	-0.27*	-0.32*	-0.35*	-0.01
ASI-3 Physical	0.06	-0.16*	-0.12	-0.21*	0.01
ASI-3 Cognitive	0.07	-0.22*	-0.35*	-0.32*	-0.02
ASI-3 Social Concerns	0.10	-0.29*	-0.33*	-0.34*	-0.01
Differences					
DASS Total	0.09	0.02	0.09	0.10	*0.20*
DASS Depression	0.14	0.02	0.16	0.15	*0.19*
DASS Anxiety	0.05	0.01	0.03	*0.18*	0.17
DASS Stress	0.04	0.07	0.01	0.08	0.15
ERQ Reappraisal	0.02	**0.30**	0.15	**<u>0.32</u>**	*0.21*
ERQ Supression	0.12	0.09	0.10	0.10	0.03
ASI-3 Total	0.09	0.05	*0.20*	0.11	0.16
ASI-3 Physical	0.06	0.03	*0.18*	0.05	0.09
ASI-3 Cognitive	0.02	0.07	*0.19*	*0.18*	0.16
ASI-3 Social Concerns	0.13	0.01	0.10	0.03	0.13

Note. * Significant correlations ($p < 0.05$). FFMQ = Five Facet Mindfulness Questionnaire; DASS = Depression Anxiety Stress Scale; ERQ = Emotion Regulation Questionnaire; ASI-3 = Anxiety Sensitivity Index-3. In comparison across sex, the medium correlation differences are depicted in italic ($0.18 <$ rdiff < 0.25), large differences in bold ($0.25 <$ rdiff < 0.32) and substantial differences in bold and underlined (rdiff ≥ 0.32).

Table 4.

Bivariate correlation differences among study variables across mindfulness experience between the FFMQ subscales and criterion variables.

	FFMQ Observing	FFMQ Describing	FFMQ Awareness	FFMQ Nonjudging	FFMQ Nonreactivity
			With mindfulness experience (*n* = 188)		
DASS Total	-0.01	-0.42*	-0.57*	-0.56*	-0.36*
DASS Depression	-0.07	-0.47*	-0.47*	-0.54*	-0.25*
DASS Anxiety	0.07	-0.22*	-0.41*	-0.37*	-0.30*
DASS Stress	-0.02	-0.35*	-0.53*	-0.47*	-0.35*
ERQ Reappraisal	0.30*	0.26*	0.18*	0.14	0.40*
ERQ Supression	-0.11	-0.56*	-0.32*	-0.37*	-0.10
ASI-3 Total	-0.01	-0.26*	-0.44*	-0.44*	-0.21*
ASI-3 Physical	-0.04	-0.12	-0.20*	-0.18*	-0.16*
ASI-3 Cognitive	0.03	-0.24*	-0.50*	-0.52*	-0.20*
ASI-3 Social Concerns	-0.01	-0.26*	-0.36*	-0.37*	-0.15
			Without mindfulness experience (*n* = 444)		
DASS Total	0.17*	-0.31*	-0.54*	-0.56*	-0.12*
DASS Depression	0.08	-0.34*	-0.50*	-0.52*	-0.14*
DASS Anxiety	0.22*	-0.25*	-0.44*	-0.43*	-0.09
DASS Stress	0.17*	-0.20*	-0.48*	-0.50*	-0.09
ERQ Reappraisal	0.16*	0.16*	0.10*	0.05	0.14*
ERQ Supression	-0.13*	-0.49*	-0.36*	-0.28*	-0.16*
ASI-3 Total	0.08	-0.32*	-0.49*	-0.43*	-0.08
ASI-3 Physical	0.07	-0.20*	-0.30*	-0.29*	-0.02
ASI-3 Cognitive	0.09	-0.29*	-0.50*	-0.43*	-0.10
ASI-3 Social Concerns	0.04	-0.31*	-0.43*	-0.36*	-0.07
			Differences		
DASS Total	*0.19*	0.12	0.02	0.00	**0.24**
DASS Depression	*0.15*	0.13	0.03	0.02	0.11
DASS Anxiety	*0.15*	0.03	0.03	0.06	**0.21**
DASS Stress	*0.19*	*0.15*	0.06	0.03	**0.26**
ERQ Reappraisal	0.14	0.10	0.08	0.09	**<u>0.27</u>**
ERQ Supression	0.02	0.07	0.04	0.09	0.06
ASI-3 Total	0.08	0.06	0.05	0.02	0.13
ASI-3 Physical	0.10	0.08	0.10	0.11	0.14
ASI-3 Cognitive	0.06	0.06	0.01	0.10	0.10
ASI-3 Social Concerns	0.05	0.06	0.07	0.01	0.07

Note. * Significant correlations (*p* < 0.05). FFMQ = Five Facet Mindfulness Questionnaire; DASS = Depression Anxiety Stress Scale; ERQ = Emotion Regulation Questionnaire; ASI-3 = Anxiety Sensitivity Index-3. In comparison across sex, the medium correlation differences are depicted in italic (0.15 < rdiff < 0.21), large differences in bold (0.21 < rdiff < 0.27) and substantial differences in bold and underlined (rdiff ≥ 0.27).
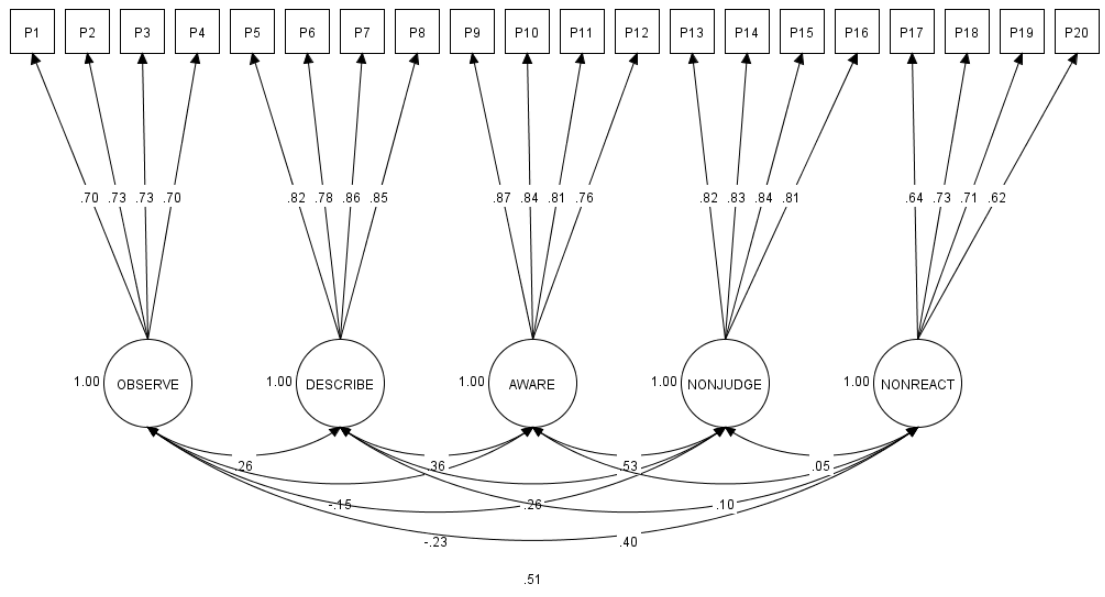
Figure 1. Model B (five intercorrelated factors).

Supplementary Table 1.

Factor loadings for each parcel from Five Facet Mindfulness Questionnaire (FFMQ).

	FFMQ subscales				
	Observe	Describe	Aware	Nonjudge	Nonreact
Parcel 1	0.70				
Parcel 2	0.73				
Parcel 3	0.73				
Parcel 4	0.70				
Parcel 5		0.82			
Parcel 6		0.78			
Parcel 7		0.86			
Parcel 8		0.85			
Parcel 9			0.87		
Parcel 10			0.84		
Parcel 11			0.82		
Parcel 12			0.76		
Parcel 13				0.82	
Parcel 14				0.83	
Parcel 15				0.84	
Parcel 16				0.81	
Parcel 17					0.64
Parcel 18					0.73
Parcel 19					0.71
Parcel 20					0.62