# Psychometric properties of the short version of the Five Facets of Mindfulness Questionnaire in Brazilian Portuguese

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**Abstract**

The aims of the current study were to evaluate the psychometric properties of a short version of the Five Facet Mindfulness Questionnaire (FFMQ-SF-BR) and verify if the addition of wording mechanisms (positive or negative) contributes to the fit of the shortened Brazilian Portuguese version of the FFMQ. Four hundred eight participants answered self-report measurements. Structural equation modelling was employed for both objectives. Adequate model fit was found for the 5-factor FFMQ-SF-BR model, with significant improvements arising from the addition of wording mechanism effects. No evidences of differential item functioning and population heterogeneity were found. Bifactor analysis showed that latent traces are preferred overusing raw sum scores. The FFMQ-SF-BR is suitable to measure mindfulness in the Brazilian population and has the benefits of decreasing data collection length without losing content coverage.
*Keywords:* psychometrics; meditation; statistical measurement.

### Propriedades psicométricas da versão curta do Questionário das Cinco Facetas de Mindfulness em português

**Resumo**

O presente estudo objetivou avaliar as propriedades psicométricas de uma versão curta em português do Questionário das Cinco Facetas de *Mindfulness* (FFMQ-SF-BR) e verificar se a adição de mecanismos de formulação dos itens (positivos ou negativos) contribui para o ajuste do modelo em cinco fatores. Quatrocentos e oito participantes preencheram instrumentos de autorrelato. Modelagem de equações estruturais foi aplicada em ambos os objetivos. Índices adequados de ajuste foram encontrados para o modelo em cinco fatores, com melhorias significativas advindas da adição dos mecanismos de formulação dos itens. Não foram encontradas evidências de funcionamento diferencial dos itens ou heterogeneidade populacional. A análise de um modelo bifator demonstrou que valores de traços latentes são preferíveis à soma da pontuação. A FFMQ-SF-BR é adequada para mensurar *mindfulness* na população brasileira, com os benefícios de diminuir o tempo de coleta sem perda de conteúdo.
*Palavras-chave:* psicometria; meditação; medidas estatísticas.

### Propiedades psicométricas de la versión corta del Cuestionario de las Cinco Facetas de Mindfulness en portugués

**Resumen**

El presente estudio tuvo como objetivo evaluar las propiedades psicométricas de una versión corta del Cuestionario de las Cinco Facetas de Mindfulness (FFMQ-SF-BR) en portugués y verificar si la adición de mecanismos de formulación de ítems (positivos o negativos) contribuye al ajuste del modelo de cinco factores. Cuatrocientos ocho participantes completaron instrumentos de autoinforme. Se aplicó el modelo de ecuaciones estructurales a ambos objetivos. Se encontraron índices de ajuste adecuados para el modelo en cinco factores, con mejoras significativas derivadas de los mecanismos de formulación de ítems. No hubo evidencias de funcionamiento diferencial de los ítems o heterogeneidad de la población. El análisis de un modelo bifactorial mostró que los valores de los rasgos latentes son preferibles a la suma puntuaciones. La FFMQ-SF-BR es adecuada para medir el mindfulness en la población brasileña, reduciendo el tiempo de recolección de datos sin pérdida de contenido.
*Palabras clave:* Psicometría; Meditación; Medidas estadísticas.

## Introduction

Research on mindfulness meditation has grown substantially over the past few decades, and its practice is being applied in different fields and contexts. As defined by Jon Kabat-Zinn, mindfulness is the "awareness that emerges from paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994). A number of different instruments have been developed to measure mindfulness levels. One of the most common currently applied is the Five Facet Mindfulness Questionnaire (FFMQ) (Quaglia, Braun, Freeman, McDaniel, & Brown, 2016). By analyzing 112 items from five mindfulness measures, the concept of mindfulness was summarized in the FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006).

The questionnaire assumes that the mindfulness trait comprises five different characteristics, which are: observe (observing both internal and external stimuli such as emotions, thoughts, and sounds), describe (labeling inner experiences), act with awareness (being attentive to the performed activity), non-reactivity (the tendency of perceiving and not being caught up by thoughts and emotions) and non-judgment (the lack of judgment when it comes to factors such as thoughts, feelings, and events) (Baer et al., 2006). It has been used both in longitudinal and cross-sectional studies to measure mindfulness in different populations (Quaglia et al., 2016).

Quaglia et al., (2016) presented a meta-analysis of randomized clinical trials testing mindfulness-based interventions that employed self-report mindfulness measurements, across the five FFMQ components. Training mindfulness skills was found to increase the scores in each domain, and changes in facet scores were correlated to changes in scores obtained in questionnaires that evaluated other mental health outcomes.

Despite the evidence that the 5 facets are key components of mindfulness, several studies that tested the factorial structure of the scale found divergent results. First, and of special relevance to the present study, is the fact that in the study of the Brazilian Portuguese version of the FFMQ (FFMQ-BR), the five facets were divided into 7. "Describe" was separated into the items with positive and negative wording and "act with awareness" was split into "distraction" and "autopilot" (Barros, Kozasa, Souza, & Ronzani, 2014). Another study suggested that although "Observe" is relevant to meditation practice, making the 5-factor solution valid for experienced meditators, a 4-factor model excluding the "observe" facet is more suitable for meditation naïve respondents (Baer et al., 2006).

In a series of studies assessing the factor structure of the FFMQ, researchers tested both a hierarchical structure, in which the five facets derive from a second order hierarchical factor, namely, a mindfulness factor, and a correlated structure, in which all the defined five facets of mindfulness are correlated. Several studies have found that both models are valid; however, the correlated 5-factor model had a slightly better performance (Hou, Wong, Lo, Mak, & Ma, 2014; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011). For a brief summary on studies of the factor structure of the FFMQ, see Cortazar, Calvete, Fernandez-Gonzalez, & Orue, 2019. On the subject of hierarchical factors, Iani, Lauriola & Cafaro (2020)

found adequate fit indices for a model in which the facets of observe, describe and act with awareness were loaded on a hierarchical factor named the "what" mindfulness skills. Although the authors expected that the facets of nonreactivity and nonjudgement would form another factor of the "how" skills, this did not hold true. Tran, Glück & Nader (2013) found that the five facets could be loaded on two hierarchical factors, namely self-regulated attention and orientation to experience. As opposed to the hierarchical models, Aguado et al. (2015) evaluated the structure of a bifactor FFMQ model, suggesting the fit of, conjointly, a general mindfulness factor and specific factors composing the five facets.

The scale contains positively and negatively worded items. This subject has been extensively studied in relation to the Mindfulness Attention and Awareness Scale (MAAS), from which several FFMQ items are derived. The developers of the scale initially stated that, because it is easier to assess states of mindlessness, negatively formulated items would be more effective at capturing these states and be a direct reflection of mindfulness states, than those which could be captured directly from positively formulated items (Brown & Ryan, 2003). The influence of positive and negative wording was also demonstrated for the FFMQ (Aguado et al., 2015; Cortazar et al., 2019; Van Dam, Hobkirk, Danoff-Burg, & Earleywine, 2012).

The FFMQ is a long instrument, composed of 39 items. Bohlmeijer et al. (2011) developed a shorter version of the questionnaire (FFMQ-SF – short form), aiming to maintain the psychometric properties of the full version, for use by researchers whose study designs include repeated measures or the application of several self-report measures. Other short versions were developed: in Spain, a short version with 25 items for children and adolescents was developed (Cortazar et al., 2019), as well as a short version for general health care service patients (Asensio-Martinez et al., 2019); A Chinese version, with 20 items (Hou et al., 2014), A German short version, also with 20 items validated in Austrian subjects (Tran et al., 2013); and the English 15-item FFMQ short version (Gu et al., 2016).

Pelham et al. (2019a) conducted an item response theory analysis of the 39-, 24- and 15-item versions of the scale and found that a reduction in the number of items impacts reliability and the range over which the measures are reliable. Overall, all versions of the scale are suitable for studies aiming to assess low to medium mindfulness levels (e.g., among meditation-naïve

participants). It is suggested that, when defining the version of the instrument to be employed in research designs, a mix of varied lengths may be used according to the objectives: facets from short FFMQ forms may be chosen when the priority is reducing burden or data collection time; facets from longer versions may be used when the goal is to achieve the maximum reliability (e.g. the most important facet for the study may be chosen from a longer version, while secondary facets may come from short versions).

A study focused on evaluating the dimensionality of the facets of the FFMQ suggested that all facets are multidimensional, reinforcing the findings of Barros et al (2014) in the Brazilian validation study, in which phrasing mechanism caused the facets of observing and acting consciously to be divided. The authors demonstrated that multidimensionality does not impact the analysis of correlation with other psychological constructs and discussed that possible ways to correct it would be by using short versions and models with latent variables (e.g. method effects, bifactor modelling).

The validation study of the Brazilian Portuguese version of the FFMQ showed it to have construct and criterion validity and reliability. The role of phrase formulation has been demonstrated in multiple studies, with the addition of method (positively or negatively worded items) effects significantly improving model fit (Aguado et al., 2015; Cortazar et al., 2019; Van Dam et al., 2012). The short versions developed and showed comparable reliability in measuring mindfulness (Bohlmeijer et al., 2011). Hence, the aims of the present study were: (1) to test the validity of a short version of the FFMQ-BR (FFMQ-SF-BR), with items selected by Bohlmeijer et al (2011); (2) to evaluate the factor structure of the Brazilian version of the short FFMQ when method factors were added (positive and negative phrase formulation).

## Methods

*Participants*

This is a secondary analysis from the original validation study of the FFMQ in Brazil (Barros et al., 2014). It is a convenience sample of 408 people who fit into one of the following categories: smokers seeking treatment at a specialist service and enrolled in treatment at the same month of the data collection ($n = 97$), community-based individuals undergoing treatment at a primary care facility ($n = 136$), college students ($n = 139$), and experienced retreat meditators, with at least

one year of experience and a frequency of practice of at least three times per week ($n = 36$). This sampling procedure was undertaken to account for varying levels of education of meditative practice. All participants were over 18 years and alphabetized in Brazilian Portuguese, to ensure an adequate level of comprehension of questionnaire items.

*Procedures*

This is a cross-sectional study of quantitative methodology. In order to recruit university students, professors from the Psychology course were contacted and allowed the announcement of our study and application of questionnaires in the classroom. Participants from basic health units or treatment services for smoking were approached in the waiting room, before going for consultation. In order for recruitment to be carried out, partnerships were made with health services in the city of Juiz de Fora. Meditators were invited to participate while in a meditation retreat (Tibetan Buddhism) in the city of Viamão, Rio Grande do Sul.

All procedures were conducted in accordance with ethical standards and approved by the university's research ethics board (CEP/UFJF n°120/2011). Informed consent was obtained from all participants included in the study. Paper versions of the self-report questionnaires were completed by participants from the different centers. The instruments were completed in groups, in the presence of a research team member, with an approximate duration of 40 minutes.

*Measures*

Participants answered the following self-report instruments:

Sociodemographic questionnaire: gender, age, marital status, monthly income and schooling.

Five Facet Mindfulness Questionnaire (FFMQ): The full version of the FFMQ was administered (39 items), but the 24 items selected by Bohlmeijer et al. (2011) were analysed. The scale uses a 5-point Likert scale, evaluating 5 components of mindfulness: the ability to observe internal and external experiences such as sensations, cognitions, sights, and sounds ($\alpha = 0.79$); describe (naming internal experiences); act with awareness; the tendency toward non-reactivity to inner experience ($\alpha = 0.73$); and non-judgement of inner experience ($\alpha = 0.84$). In the Brazilian validation, the "describe" facet was subdivided into 2 components, positive ($\alpha = 0.78$) and negative ($\alpha = 0.83$) formulation. "Act with awareness" was divided into "auto pilot" ($\alpha$

=0.80), referring to the automatic pilot behavior with items such as "I rush through activities without being really attentive to them"; and "distraction" (α=0.73), reflecting the behavior of acting absent mindedly, e.g. "When I do things, my mind wanders off and I'm easily distracted" (Baer et al., 2006; Baer et al., 2008; Barros et al., 2014).

Subjective Well-Being Scale (SWBS): a 62-item questionnaire comprising three aspects: positive affect, negative affect and life satisfaction. In the first 47 items, both positive (α = .95) and negative affect (α = .95) are measured in a 5-point Likert scale ranging from "not at all" to "extremely." The last 15 items are related to life satisfaction and answers are given on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" (α = .90) (Albuquerque & Tróccoli, 2004).

*Data Analyses*

All analyses were conducted using the software R, version 4.0.2, and the packages lavaan (Rosseel, 2020) and semTools (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2020). The factor structure of the FFMQ was tested using confirmatory factor analysis (CFA) in a structural equation modelling environment, using robust maximum likelihood estimation. The theoretical rationale behind the model definition was based on four previously published studies: (1) Bohlmeijer et al. (2011) – developed the short version of the instrument under validation in the present study, finding a better fit for the correlated 5-factor model; (2) Van Dam et al. (2012) – tested several models that considered the effect of phrase formulation (negative or positive), using the correlated 5-factor model; (3) Cortazar et al., 2019 – in addition to a literature review about the factor structure of the FFMQ, the authors validated a short version for adolescents, based on the correlated 5-facets and method effects.

To test construct validity, two models were built: Models 1 and 2 considered the 24 items of the 5-factor short version, with the method effects added to model 2. Model fit was evaluated based on the criteria described by Hair, Black, Babin, & Anderson (2014) for samples larger than 250 individuals, with 12 to 30 observed variables: chi-squared ($\chi^2$) and degrees of freedom (df), expecting significant values (p > 0.05), a comparative fit index (CFI) > .92, an SRMR < .08 and a root mean squared error of approximation accompanied by the 90% confidence interval (RMSEA [90% CI]) < .07. Improvements resulting from the addition of the method effects latent factors were evaluated

using a likelihood test, which verifies whether there is a significant decrease in chi-square value.

As a measure of reliability, Raykov's rho (ρ) coefficients were calculated for each facet of the FFMQ, considering values above 0.7 as adequate reliability (Hair et al., 2014). From the construction of a bifactor model, constituted as the 5 facets as orthogonal latent variables and a general factor loading in all items (general mindfulness factor), reliability measures and the viability of using raw sum scores were obtained. Coefficients omega (ω) and hierarchical omega ($\omega_h$), for the general factor and subscales ($\omega_s$ and $\omega_{hs}$), were calculated in an excel-based bifactor indices calculator (Dueber, 2017). The omega coefficients (ω e $\omega_s$) indicate the capacity of unit-weighted scores to measure the variance attributed to the multiple latent variables specified in the model; hierarchical omega coefficients represent the amount of variance explained by the factor in question, removing the influence of the general factor ($\omega_h$ e $\omega_{hs}$) (Rodriguez, Reise, & Haviland, 2016a, 2016b).

To evaluate measurement invariance, Multiple Indicators Multiple Causes (MIMIC) models were tested, following the methodology proposed by Brown (2015). Age, gender and education were added to the base model (the correlated 5-factor model was chosen). Significant paths between a covariate and a latent factor indicate the presence of population heterogeneity ($p < .05$). Significant paths, considered when modification indices were > 4, between a covariate and a FFMQ item indicate Differential Item Functioning (DIF).

Latent traces were extracted from the correlated 5-factor model and used in further analyses. Additional evidences of construct validity were obtained from the analysis of the correlations between the short FFMQ facet scores and the SWBS domains, expecting moderate positive values. As for criterion validity, 31 participants were randomly selected from the community-based sample, students and smokers, matched by gender, age, education, and household income to the sample of meditators ($n = 36$). Their mean scores (36 meditators *versus* 31 non-meditators) on each facet were compared using linear regression models, expecting meditators to have higher scores in each facet.

**Results**

The majority of our sample was women (72.8%), aged 18 to 80 (mean = 39.20, SD = 16.55). The sample

was varied in respect of education level. Some of the data were collected from college students, which is partly responsible for the relatively high percentage of participants who reported a complete or incomplete college education. The sociodemographic characteristics are reported on Table 1.

*Factor structure*

*Construct validity*

Table 2 summarizes the goodness-of-fit indices of the tested models. The addition of latent variables referring to the method effects significantly improved the 5-factor model (scaled $\Delta\chi^2$ = 169.28, p<0.001). Covariances between the latent variables representing the facets presented moderate positive values between most pairs, ranging from .61 (non-reactivity and observe) to .18 (observe and act with awareness). No correlations were found between describe and non-judgement and the pair non-reactivity and act with awareness. A negative correlation was found between non-reactivity and non-judgement. All factor loadings were > .32. Correlations among the positive and negative method effect latent variables were nonsignificant (p = 0.748).

*Reliability*

Reliability coefficients ($\rho$) for each facet were as follows: acting with awareness $\rho$ = .77, describe $\rho$ = .69, non-judgement $\rho$ = .71, non-reactivity $\rho$ = .61 and observe $\rho$ = .75. As for the bifactor reliability indices, considering all latent variables (facets and general mindfulness factor), the following indices were found: for the total scale $\omega$ = .831, observe $\omega_s$ = .746, describe $\omega_s$ = .762, non-reactivity $\omega_s$ = .626, non-judgement $\omega_s$ = .714 and act with awareness $\omega_s$ = .774. The coefficients decreased when the variance explained by the general factor was removed: $\omega_h$ = .488, observe $\omega_{hs}$ = .365, describe $\omega_{hs}$ = .561, non-reactivity $\omega_{hs}$ = .309, non-judgement $\omega_{hs}$ = .652, act with awareness $\omega_{hs}$ = .750.

Table 1.
*Sociodemographic characteristics of participants (N = 408)*

| | Category | N | % |
|---|---|---|---|
| Sex | Male | 111 | 27.2 |
| | Female | 297 | 72.8 |
| Age group | 18 to 25 | 137 | 33.6 |
| | 26 to 44 | 93 | 22.8 |
| | 45 to 64 | 153 | 37.5 |
| | 65 or more | 21 | 5.1 |
| *Missing = 4* | | | |
| Marital status | Single | 213 | 52.2 |
| | Married | 129 | 31.6 |
| | Divorced | 51 | 12.5 |
| | Widowed | 11 | 2.7 |
| *Missing = 4* | | | |
| Monthly income (minimum wages)[1] | Up to 3 | 200 | 49.0 |
| | 3 to 6 | 108 | 26.5 |
| | 6 to 10 | 53 | 13.0 |
| | More than 10 | 42 | 10.3 |
| *Missing = 5* | | | |
| Schooling | Elementary school (complete or incomplete) | 104 | 25.5 |
| | High school (complete or incomlpete) | 87 | 21.3 |
| | College (complete or incomplete) | 217 | 53.2 |

1. By the time of data collection, a minimum wage was the equivalent of BRL545,00.

*Measurement invariance*

The covariates age, gender and education were added to the correlated 5-factor model, aiming to test the existence of differential item functioning or heterogeneity among population groups in the latent variables. Age had an effect in the facets of non-reactivity ($\beta$ = .356, *p*<.001) and observe ($\beta$ = .367, p<.001), indicating that older respondents tended to score higher in these subscales. Gender had an effect for the describe ($\beta$ = .156, p=.008) and non-reactivity facets ($\beta$ = .133, p=.041), with these skills tending to be more developed in men. In respect of education, compared to those with a college education, individuals who completed only elementary school tended to score higher in the facet of non-judgement ($\beta$ = .348, p<.001) and lower in the describe facet ($\beta$ = -.289, p<.001); respondents with high school education scored higher in non-judgement ($\beta$ = .289, p<.001). The analysis of modification indices did not present evidence of DIF for any of the items.

*Correlations between the facets*

Moderate and positive correlations were found between the FFMQ-SF and SWBS facets, in the sense that higher mindfulness was related to higher well-being. The only pair that did not correlate was positive affect and non-judgment (Table 3).

*Criterion validity*

Linear regression models were used to compare the scores obtained in each facet in a subsample of meditators and non-meditators. Except for the non-judgment facet, there was a significant difference in the mean score between the groups, ranging from .91 points (facet of describing) to .28 points (facet of acting with awareness) with meditators having higher scores (Table 4).

**Discussion**

The present study aimed to present evidence of validity of a short version, with items selected by Bohlmeijer et al. (2011) for the Brazilian population. Satisfactory indices of reliability, measurement invariance, criterion and construct validity were found.

The validation results of the short version would have to be comparable to those obtained by Barros et al. (2014) to confirm that there was no loss of psychometric properties in the process of choosing the items. Analyzing the pattern of correlations of the facets of the questionnaires, positive and moderate values were found in most relationships in both studies; however, in the present study, a negative relationship was identified between non-reactivity and non-judgement.

Table 2.
*Goodness-of-fit indices of the models assessing the factor structure of the complete FFMQ, FFMQ-SF and the bifactor model*

| Questionnaire | Model | $\chi^2$ *(df)* | *p* | RMSEA [90 CI] | CFI | SRMR |
|---|---|---|---|---|---|---|
| FFMQ-SF (24 items, selected by Bohlmeijer et al., 2011) | Correlated, 5-factor | 443.87 (242) | <0.001 | .045 [.039; .052] | .886 | .072 |
| | Correlated, 5-factor, correlated negative and positive scoring | 247.79 (217) | <0.001 | .019 [.00; .028] | .985 | .046 |
| | Bifactor model | 434.51 (228) | <0.001 | .047 [.041; .053] | .889 | .094 |

Table 3.
*Correlations between the Short FFMQ facets and dimensions of the SWBS*

| | Short form | Nonjudge | Actaware | Describe | Nonreact | Observe |
|---|---|---|---|---|---|---|
| SWBS | Positive Affect | .009 | .30* | .42* | .36* | .35* |
| | Negative Affect | .23* | .41* | .36* | .27* | .20* |
| | Life Satisfaction | .21* | .31* | .28* | .22* | .17* |
| | Total | .18* | .41* | .42* | .33* | .28* |

*Significant with p-value < .001.

Table 4.
*Linear regression models comparing the scores obtained in each facet in a subsample of meditators (n = 36) and non-meditators (n = 31)*

|  | B | SE | 95% CI | *p* |
|---|---|---|---|---|
| Nonjudge | .23 | .12 | [-.34; .014] | 0.065 |
| Actaware | .28 | 0.09 | [-.46; -.091] | 0.0042* |
| Describe | .91 | 0.19 | [.52; .1.30] | <0.001* |
| Nonreact | .41 | 0.062 | [.29; .54] | <0.001* |
| Observe | .77 | .19 | [-.49; 0.064] | 0.0011* |

B = regression coefficient; SE = standard error

Although this result is contrary to the literature, which usually indicates that these two facets are highly correlated, Iani, Lauriola e Cafaro (2020) found a lack of relationship between these two facets (Iani et al., 2020). Regarding the comparison of scores between meditators and non-meditators, Barros et al. (2014) found significant differences between these groups for all facets (Barros et al., 2014). In the present study, the scores obtained using the short version differed for every facet except the non-judgment facet, a result that was previously found by Bränström, Duncan & Moskowitz (2011), who also found no differences in describe and act with awareness. Construct reliability of the present study, varying from .61 to .77, was comparable to that obtained by Barros et al. (2014) of .67 to .85 (Barros et al., 2014).

Regarding correlations with SWBS, positive and moderate values were also found in most relationships, replicating the results of Barros et al. (2014). Our results also agree with the literature that has highlighted the potential of mindfulness in promoting well-being (Gu, Strauss, Bond, & Cavanagh, 2015; Bamber & Kraenzle Schneider, 2016; Zhang et al., 2015).

Our results highlight the importance of considering the effect of item phrasing (negative or positive) in the response behavior. Similar to the findings of Van Dam et al. (2012), Aguado et al. (2015) and Cortazar et al. (2019), there was a significant improvement in goodness-of-fit indices when factors that considered the wording mechanisms of the items were taken into account. However, in the present validation of the short version in Portuguese-speaking adults, the positive and negative method effects were not correlated. This result is contrary to what was found among English-speaking college students (Van Dam et al., 2012) and Spanish

children and adolescents (Cortazar et al., 2019), but agrees with what was found for Spanish adults (Aguado et al., 2015) and suggests that Brazilians might be more susceptible to one formulation and not the other.

When evaluating the indices derived from the bifactor model, we found that 48.8% ($\omega_h$ = .488) of the variance obtained in unit-weighted scores could be attributed to individual differences in the general mindfulness facet. As evidenced by the decrease in $\omega_{hs}$ relative to $\omega_s$, there is a significant loss in the proportion of systematic variance explained by the individual facet when the influence of the mindfulness general factor is removed, except for the acting with awareness facet. Although most studies evaluating FFMQ psychometric properties have used Cronbach's alpha as a measure of reliability and a simple sum of items to measure facets, our results argue against these practices. Using raw facet scores obtained directly from summing the answers in each item is not advised and more reliable estimates could be obtained by extracting latent traces in a structural equation modeling environment. However, our results suggest that a general composite score can be used to measure mindfulness as a whole. The FFMQ bifactor model was evaluated by Aguado et al. (2015), who, contrary to the findings of the present study, found greater reliability in using facet scores individually, as the general mindfulness factor was responsible for explaining a lower percentage of variance, except for acting with awareness.

Regarding population heterogeneity, it was found that age has a significant effect on the ability to observe and non-reactivity, with older individuals tending to have higher scores in these subscales. Previous studies (Alispahic & Hasanbegovic-Anic, 2017; Branstrom et al., 2011) corroborate the fact that older people remain more focused on the present moment, also impacting the level of mindfulness. One possible explanation is that younger people tend to be more concerned about the future and the decisions to be made about it, while older people have had more life experience, more emotional regulation and less negative emotional experiences (Gross et al., 1997).

Regarding gender, men were more likely to have more developed describing and non-reactivity skills. Although other studies (Alispahic & Hasanbegovic-Anic, 2017; Branstrom et al., 2011) also found gender differences, they differed in respect to which facets. For example, Bränström et al., (2011) found that Swedish women had higher scores in relation to ability to observe and describe, while men scored higher in the

other facets. Women also seem to benefit most from mindfulness training, although not conclusively (Rojiani, Santoyo, Rahrig, Roth, & Britton, 2017). It is probable that differences in cognitive and emotional functioning between men and women (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008; Tamres, Janicki, & Helgeson, 2002) also impact their levels of mindfulness.

Less education (until elementary or high school) was related to a higher non-judgment ability. Having education until elementary school was also related to a lower ability to describe, which was similar to that found by Bränström et al (2011), who also identified that people with higher educational levels had higher level of mindfulness and ability to observe, describe and act with awareness. Given that the ability to describe implies labeling internal or external experience, perhaps people with lower education have a poorer repertoire of words, thus impacting the development of this ability.

Our results suggest that the short version of FFMQ is suitable for use among Brazilians for several reasons. Using a short version allows for faster application of the questionnaire with the assurance that there was no loss in psychometric properties and content coverage. As suggested by Pelham et al. (2019a), researchers may choose facets of varied lengths, coming from shorter or longer versions of the FFMQ according to the objectives of the study. The validation of the FFMQ-SF-BR provides smaller versions of the facets with adequate reliability, for when researchers aim to reduce the burden of filling self-report instrument. Pertaining the multidimensionality problem (Pelham et al. (2019b) the reduction in the number of scale items and addition of method effects improved model fit and corrected the multidimensionality issue reported by Barros et al. (2014) in the facets of describing and acting with awareness of the FFMQ-BR.

Similarities were found between the factorial structure found in the present study and in the study by Bohlmeijer et al. (2011), who made the choice of the items, and other short version studies that found validity of both the five-factor model by itself and with the addition of the method effects (Aguado et al, 2015; Cortazar et al., 2019). In the present study, invariance measures were also evaluated, both population heterogeneity and differential item functioning. It was found that sociodemographic variables influence different domains, without exacerbated influence on a specific domain, demonstrating that the scale can be applied with participants from different sociodemographic backgrounds.

However, the paper has some limitations that must be addressed. Our sample has an overrepresentation of women (72.8%), thus the replication of our findings in a sample with an equal gender distribution is warranted. Regarding the parameter invariance, no analyses were conducted to prove the stability of the scale over time. Additionally, the invariance between independent samples was not tested. These limitations help to indicate the direction of future studies. Comparison of scores between meditators and non-meditators could not be conducted by a robust invariance measurement (such as the addition of a covariate for meditative practice in MIMIC models), since the sample contained only 36 participants who considered themselves meditators and no data regarding the practice itself was collected (e.g. weekly frequency/duration of practice, years of experience).

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