



The European Portuguese Version of the Determinants of Meditation Practice Inventory-Revised (DMPI-R)

Bárbara Monteiro^{1,2} · Ana Galhardo^{1,2} · Marina Cunha^{1,2} · José Pinto-Gouveia²

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Abstract

Objectives Meditation practice has beneficial effects on physical and mental health, and barriers to regular practice have been recognized. The Determinants of Meditation Practice Inventory (DMPI) was developed and recently revised (DMPI-R). DMPI-R is a 12-item self-report instrument encompassing four dimensions: low perceived benefit, perceived inadequate knowledge, perceived pragmatic barriers, and perceived socio-cultural conflict. The current study aimed to investigate the psychometric properties and factor structure of the European Portuguese version of the DMPI-R in a general population Portuguese sample (non-meditators).

Methods A sample comprising 154 participants completed a set of self-report measures online. Exploratory factor analysis (EFA) and parallel analyses were conducted to decide on the number of factors. Confirmatory factor analysis (CFA) was computed in an independent sample ($N=229$). Three models were tested and compared. Reliability and validity were analyzed.

Results The EFA and parallel analysis revealed a four-factor structure. The three models tested showed a good fit to the data. Models' comparison pointed that the four-factor model, excluding item 10, was the one with the lower Expected Cross-Validation Index. The DMPI-R factors revealed adequate reliability and test–retest stability. The DMPI-R showed correlations with experiential avoidance and perspectives on meditation. No significant differences were found between men and women on the DMPI-R four factors. No significant associations with age and years of education were found.

Conclusions The European Portuguese version of DMPI-R is a reliable and valid self-report instrument to assess perceived barriers to meditation, contributing to expand research and support meditation instructors in improving meditation programs.

Keywords Meditation · Barriers · Assessment · Psychometric properties · Factor structure

Meditation has become popular in the last decades. One example of meditation practices that is currently widespread and evidence based (Goldberg et al., 2022) is mindfulness meditation. According to Jon Kabat-Zinn (1994, p. 4), mindfulness involves “paying attention in a particular way: on purpose, in the present moment, and non-judgmentally.” Increasing dissemination of meditation practice in various contexts has led to some misconceptions, misinformation,

and unmet expectations with consequences for meditation practice and research (Van Dam et al., 2017). Thus, the non-controlled spreading of meditation practice may also lead to the decline or disappointment about this approach and constraint its potential benefits (Van Dam et al., 2017). Nevertheless, there are few studies addressing barriers to meditation, highlighting the importance of assessing meditation practice barriers.

Mindfulness practice is mainly rooted in the Buddhist tradition as one of the components of cultivating a path towards awareness, consciousness, and ending the illusion of a separated self (including cognitive, emotional, social, and ethical dimensions) (Brito, 2014; Grossman, 2010; Mikulas, 2011). Some misconceptions about meditation may be related to poor knowledge regarding this practice and its real intentions (Brito, 2014; Grossman, 2010; Mikulas, 2011). Western culture seems to highlight some benefits of mindfulness practice (such as relaxation, calming mind, emotion

✉ Bárbara Monteiro
barbarasdmonteiro@gmail.com

¹ Instituto Superior Miguel Torga, Largo da Cruz de Celas, nº1, 3000-132 Coimbra, Portugal

² University of Coimbra, Center for Research in Neuropsychology and Cognitive and Behavioral Intervention CINEICC), Faculty of Psychology and Educational Sciences, R. Do Colégio Novo, 10A, 3001-802 Coimbra, Portugal

regulation), and unmet expectations are created due to the confusion between the potential benefits and the aims of meditation (Brito, 2014; Grossman, 2010; Mikulas, 2011).

Although several studies (Goldberg et al., 2022) have demonstrated the benefits inherent to health promotion, meditation practice is more than a tool to relieve stress or unpleasant symptoms, cultivate a calming mind, and improve attention. Lack of knowledge about meditation as a “way of being” and an embodied practice in daily life rather than a concept or a technique can originate misunderstandings for researchers, instructors, and partitioners. In fact, the Western perspective regarding meditation practice may be reductionist and distorted. Brito (2014) manifested concerns about detaching mindfulness practice from its historical and cultural context (and spiritual tradition), increasing the risk of reductionism (of its original value) and misinterpretation.

Considering the origins of meditation, it is essential to notice that this ancient traditional practice has been integrated into western culture and the scientific field, resulting in the development of, for example, mindfulness-based interventions (MBIs). MBIs were developed and applied to different populations and settings. MBIs encompass contemplative practices and are influenced by science, medicine, psychology, and education (Crane et al., 2017). There is mounting evidence of MBIs’ beneficial effects on physical and mental health (e.g., depression, anxiety, chronic pain, cancer recovery) (Crane et al., 2017; Dimidjian et al., 2016; Lenz et al., 2016; Rose et al., 2020). A recent systematic review, including 44 meta-analyses of randomized controlled trials of MBIs, with 336 studies and 30,483 participants, supported mental health and well-being improvements and pointed to the transdiagnostic relevance and long-term effects of these interventions (Goldberg et al., 2022).

In-session and between-session meditation practices are fundamental in MBIs (Crane et al., 2017). Kabat-Zinn (2003) stated that home-practice increases levels of mindfulness and improves the interventions’ impact. Engagement with meditation training is essential to enhance these effects and promote an experiential understanding of this mind–body practice (Crane et al., 2017; Van Dam et al., 2017). Nevertheless, there were mixed results regarding the effect of home-practice regularity and duration. For example, Parsons et al. (2017) found small to moderate associations between home-practice and treatment outcomes. Lloyd et al. (2018) also pointed to the relevance of measuring home-practice quantity and quality. As there is heterogeneity in the measurement of home-practice across studies, this is a limitation to a more in-depth knowledge of home-practice relevance.

Initial contact with meditation practice can also present barriers or difficulties reflecting the need to promote an adjusted experience for students, clients, or patients, during meditation learning (Bamber & Schneider, 2022; Banerjee

et al., 2018; Toivonen et al., 2020). Experiences such as pain, discomfort, unpleasant thoughts, silence, painful emotions, and the absence of relaxation or of having a positive experience can be interpreted as an incorrect way to practice, leading to avoidance (Cohen-Katz et al., 2005). Time, scheduling, and family management are also reported as practical difficulties in implementing a systematic meditation practice (Toivonen et al., 2020).

The inability to differentiate meditation from breathing or relaxation techniques and the belief that it is a calming or emptying mind exercise is also reported by participants when asked about their conception of meditation (Russel et al., 2018). Long-term barriers are also reported. Lomas et al. (2015) developed a qualitative analysis of experiential challenges in men associated with meditation. This study showed that special attention should be given to men’s challenges concerning emotion regulation and the possibility that previous depression symptoms were exacerbated in the so-called grey meditators (people who meditate independently of monitored interventions). Despite limited evidence, symptoms such as anxiety, rumination, psychotic episodes, and panic were reported (Lomas et al., 2015). In the same direction, Schlosser et al. (2019) presented unwanted effects that are linked to meditation (mainly in some types of meditation) as “anxiety, fear, distorted emotions or thoughts, altered sense of self or the world” (p. 7). Meditation is a challenging skill and may need to be practiced with some guidance, particularly in particular contexts or when there are clinical symptoms (Lomas et al., 2015).

These obstacles and misunderstandings impact motivation and may add to suffering or lead to incorrect use of meditation (e.g., rumination, self-criticism) (Banerjee et al., 2018; Russel et al., 2018). Although evidence about meditation-related adverse/side effects is scant (Britton et al., 2021), this is a relevant topic and may be linked to barriers and incorrect use or contexts of meditation.

Recognizing and assessing these barriers in meditation novices allows for a more tailored psychoeducation and experience, fostering practice continuity. Understanding barriers to meditation can also increase adherence to the MBIs, allowing facilitators/professors to work on reported difficulties, promote motivation to practice, and decrease the probability of adverse effects. Developing strategies to prevent dropout in MBIs is essential in clinical and research practice, allowing more opportunities to respond to limitations pointed to studies in this field. In a mixed-method study, Toivonen et al. (2020) suggested adopting a few strategies to overcome dropout rates in MBIs. These strategies may translate into different MBI structures, using online solutions to understate practical barriers and adapting interventions to their target populations (e.g., clinical and non-clinical) and settings. Thus, the availability of assessment instruments addressing meditation barriers is an important resource.

The Determinants of Meditation Practice Inventory (DMPI; Williams et al., 2011) was developed to assess perceived barriers to meditation in a population without meditation experience. The DMPI was designed based on interviews with meditation teachers and evidence-based literature. It comprises 17 items, scored on a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Higher scores reveal higher levels of perceived barriers to meditation. Toivonen et al. (2020), in a study conducted with cancer survivors, modified the DMPI to adjust its content to this population (DMPI-Cancer). However, no data on this version's validity or reliability are provided.

Hunt et al. (2020) proposed a 12-item revised version (DMPI-R), showing a four-factor model: (1) low perceived benefit, (2) perceived inadequate knowledge, (3) perceived pragmatic barriers, and (4) perceived socio-cultural conflict. Although items "I am uncomfortable with silence" and "I cannot stop my thoughts" were removed based on psychometric criteria, the authors recommend its use in clinical settings. The DMPI showed a Cronbach of 0.87 (Williams et al., 2011), but no reliability results are available for the DMPI-R (Hunt et al., 2020). The DMPI-R four scales showed convergent and discriminant validity (Hunt et al., 2020).

Studies assessing barriers to meditation used different methodologies (Banerjee et al., 2018; Russel et al., 2018; Toivonen et al., 2020; Williams et al., 2012) this being an obstacle to comparing results and conclusions. The DMPI is, to our knowledge, the only self-report instrument developed for this purpose. Moreover, the hypothesis that barriers to meditation may be sensitive to cultural aspects justifies the study of the European Portuguese version of DMPI-R, promoting cross-cultural research. The current study aimed to translate and investigate the psychometric properties and factor structure of the European Portuguese version of the Determinants of Meditation Practice Inventory-Revised (DMPI-R) in a general population Portuguese sample (non-meditators).

Methods

Participants

The current study was conducted in two non-meditators samples. Sample 1 comprised 154 (90 women and 64 men) participants, presenting a mean age of 26.61 ($Md = 24.00$; $SD = 8.28$; $Sk = 1.7$; range 18–63; inter-quartile range: 21.00 to 30.00) years old and a mean of 14.29 ($Md = 15.00$; $SD = 2.15$; $Sk = 0.37$; range 11–22; inter-quartile range: 12.00 to 16.00) years of education. Seventy-eight (50.6%) participants were students and 76 (49.4%) were non-students. The majority of participants were single ($n = 136$;

88.3%), followed by married or living with a partner ($n = 15$; 9.7%), and divorced ($n = 3$; 1.9%).

A sample 1 sub-sample of 55 participants (33 women and 22 men) completed the European Portuguese version of the DMPI-R 6-weeks later to assess test–retest reliability. The mean age of these participants was 26.58 ($Md = 23.00$; $SD = 8.59$; $Sk = 1.51$; range 18–51; inter-quartile range: 21.00 to 31.00) years old. They were mainly single ($n = 49$; 87.5%), followed by married or living with a partner ($n = 4$; 7.1%), and divorced ($n = 2$; 3.6%). Concerning years of education, a mean of 14.35 years ($Md = 15.00$; $SD = 2.00$; $Sk = -0.01$; range 12–18; inter-quartile range: 12.00 to 16.00) was found, and 33 (60%) were students and 22 (40%) were non-students.

Additionally, a second sub-sample (from sample 1) of 75 participants (52 women and 23 men) completed a questionnaire composed of the DMPI-R and other measures used in this inventory original study. In this sub-sample, the mean age was 29.13 ($Md = 27.00$; $SD = 9.54$; $Sk = 1.30$; range 18–63; inter-quartile range: 22.50 to 31.00) years old, and a mean of 14.75 ($Md = 15.00$; $SD = 2.29$; $Sk = 0.22$; range 11–22; inter-quartile range: 12.00 to 17.00) years of education was found. Twenty-five (33.3%) participants were students and 50 (66.7%) were non-students. Most participants were single ($n = 63$; 84%), followed by married or living with a partner ($n = 9$; 12%), and divorced ($n = 3$; 4%).

A second non-meditators sample (sample 2) was used to further confirm the DMPI-R factor structure. Sample 2 comprised 229 participants (170 women and 59 men). Participants mean age was 31.35 ($Md = 31.00$; $SD = 12.01$; $Sk = 0.89$; range 18–75; inter-quartile range: 20.00 to 38.00) years old, and the mean of years of education was 13.95 ($Md = 13.00$; $SD = 2.33$; $Sk = 0.24$; range 8–20; inter-quartile range: 12.00 to 16.00). Eighty (34.9%) participants were students and 149 (65.1%) were non-students. Most participants were single ($n = 140$; 61.1%), followed by married or living with a partner ($n = 77$; 33.6%), and divorced ($n = 12$; 5.2%).

Procedures

The translation of the DMPI-R from the original English version to the Portuguese language was accomplished in several steps, according to the recommendations of Hambleton et al. (2005) and the International Test Commission (2017). An English native speaker, fluent in Portuguese and acting as a language teacher, translated the DMPI-R items to Portuguese. The researchers (Portuguese native speakers speaking English fluently) translated it back to English and confirmed each item's content similarity (back translation) (Erkut, 2010). This preliminary version of the Portuguese DMPI-R was completed by a group of 10 undergraduate students who were asked to comment on the instructions

and the items' clarity and understandability. No difficulties or inconsistencies were described.

Inclusion criteria were age (18 years old or older) and no meditation practice. The study was disseminated through social media (snowball sampling). Participants were informed about the study aims, the voluntary nature of participation and the anonymity and confidentiality of the collected data. The research protocol was made available online, and informed consent was mandatory before completing the self-report measures. Data collection took place from November 2020 and December 2021.

Measures

Perspectives on Meditation (Hunt et al., 2020) corresponds to a set of five questions related to intents and perceptions about meditation: “How likely are you to seek an opportunity to meditate in the near future?” using a scale ranging from *not at all likely* (1) to *extremely likely* (7); “How interested are you in doing meditation?” and “How interested are you in learning more about meditation?” rate from *not at all interested* (1) to *extremely interested* (7); “To what extent do you think meditating would help you?” respond using a scale from *not at all* (1) to *great deal* (7); and finally “How difficult do you think it would be to learn meditation?” using a 7 point scale ranging from *not at all* (1) to *extremely difficult* (7). These questions were part of the original study of DMPI-R (Hunt et al., 2020) and were translated to European Portuguese. According to Hunt et al. (2020), participants who present lower levels of perceived barriers to meditation report a more positive perspective about meditation.

Acceptance and Action Questionnaire II (AAQ-II; Bond et al., 2011; Portuguese version by Pinto-Gouveia et al., 2012). The AAQ-II assesses experiential avoidance. This self-report instrument encompasses seven items (e.g., “My painful experiences and memories make it difficult for me to live a life that I would value”). Participants are asked to rate the seven items using a 7-point scale, ranging from *never true* (1) to *always true* (7). Higher scores reveal higher experiential avoidance. A Cronbach's alpha means of 0.84 (different samples) was found in the AAQ-II original version (Bond et al., 2011). In the Portuguese version of the AAQ-II, a Cronbach's alpha value of 0.90 was found (Pinto-Gouveia et al., 2012). In this study, a Cronbach's alpha of 0.95 and a McDonald's $\omega = 0.95$ were found for the AAQ-II.

Distress Tolerance Scale – Simon (DTS-S; Simons & Gaher, 2005; Portuguese version by Lucena-Santos et al., 2013). The DTS-S is a self-report instrument that assesses distress tolerance. Participants are invited to think about moments of distress and respond to 15 items on a 5-point scale, ranging from *strongly disagree* (1) to *strongly agree* (5). The DTS-S assesses general distress tolerance, as well as four dimensions: Tolerance (e.g., “Feeling distressed or

upset is unbearable to me”), Appraisal (e.g., “I can tolerate being distressed or upset as well as most people”), Absorption (e.g., “When I feel distressed or upset, all I can think about is how bad I feel”), and Regulation (e.g., “I'll do anything to avoid feeling distressed or upset”). The total score is obtained through the means of the subscales scores, and higher scores indicate higher distress tolerance. In the original version, the DTS-S showed a Cronbach's alpha value of 0.82 to the total score and Cronbach's alpha values ranging from 0.70 to 0.82 for the subscales (Simons & Gaher, 2005). In the Portuguese version of DTS-S, a Cronbach's alpha value of 0.85 was reported (Lucena-Santos et al., 2013). In this study, a Cronbach's alpha of 0.95 and a McDonald's $\omega = 0.93$ were found.

Data Analyses

Statistical analyses were computed using R, version 4.1.2 (R Core Team, 2021) and the Statistical Package for the Social Sciences (SPSS, version 27 Chicago, IL, USA). To describe participants' sociodemographic characteristics, descriptive statistics were computed. As a preliminary analysis, skewness and kurtosis were computed for all DMPI-R items. Results suggested that there were no severe violations to a normal distribution when $Sk < |3|$ and $Ku < |10|$ (Kline, 2005).

Exploratory and confirmatory factor analyses (EFA and CFA) were conducted using the “psych” (Revelle, 2021) and “lavaan” (Rosseel, 2012) packages (Sellbom & Tellegen, 2019). Considering ordinal data, polychoric correlations were implemented, and parallel analysis and scree plot inspection were performed. The DMPI-R structure was tested through EFA, using an unweighted least squares (ULS) analysis with a direct oblimin and factor scores estimated with TenBerge method. A CFA with the weighted least square mean and variance (WLSMV) estimation method (Li, 2016) was computed. To inspect the model adequacy, three models were tested. A hierarchical model with one second-order factor explaining the four DMPI-R factors (model 1), a four correlated factor model (model 2), and a four correlated factor model removing item 10 from factor 2 (model 3) were tested.

The following goodness-of-fit indices were used: CMIN/df, with values ranging from 2 to 5 indicating good fit; the Comparative Fit Index (CFI), the Tucker and Lewis Index (TLI), which indicate an adequate model fit to the data when values vary between 0.90 and 0.95; and the standardized root mean square residual (SRMR) which points to an acceptable fit when values are < 0.08 (Hu & Bentler, 1999). The root mean square error of approximation (RMSEA) was calculated using 90% confidence intervals, with 0.05 to 0.08 indicating a reasonable error and acceptable fit (Kline, 2005). The Expected Cross-Validation Index (ECVI) was used for the models' comparison. Items' local adjustments

were ascertained through standardized regression weights and squared multiple correlations. Standardized regression weights higher than 0.40 and squared multiple correlations higher than 0.25 were considered adequate (Tabachnick & Fidell, 2007).

Differences between men and women were analyzed through independent samples *t*-tests whenever the *t* test assumptions were verified, and Cohen's *d* measured effect sizes. According to Sawilowsky (2009), effect sizes $d=0.01$ are considered very small, $d=0.20$ as small, $d=0.50$ as medium, $d=0.80$ as large, $d=1.20$ as very large and $d=2.00$ as huge. When the homogeneity of variance assumption was violated, the *U* Mann–Whitney was calculated.

Items' mean, standard deviation, and item-total correlations were calculated. To examine the DMPI-R reliability, Cronbach's alpha, Spearman-Brown, coefficient (Eisinga et al., 2013), McDonald's omega (McNeish, 2018; Trizano-Hermosilla & Alvarado, 2016; Viladrich et al., 2017) and composite reliability (CR; Peterson & Kim, 2013) were used, and values above 0.70 denote good reliability (Field, 2013). The computation of the composite reliability (CR) and of the average variance extracted (AVE) was also conducted to further determine construct reliability and convergent validity. A composite reliability calculator was used (estimates CR based on standardized factor loadings and error variances) (Raykov, 1997). AVE results were calculated through the computation of the AVE formula (Fornell & Larcker, 1981).

Test–retest reliability was calculated through paired-samples *t*-tests in a sub-sample of 55 participants. Additionally, Pearson and Spearman correlation analyses were also computed to address test–retest reliability. According to Gignac and Szodorai (2016) and Funder and Ozer (2019), correlation coefficients between 0.10 and 0.20 indicate small correlations, between 0.20 and 0.30 medium, between 0.30 and 0.40 large, and above 0.40 very large. Pearson and Spearman correlations between the DMPI-R factors and other measures addressing similar and related constructs were estimated.

Sensitivity analyses were performed to all contrasts with 90% power, using the G*Power software. Effects with $p < 0.050$ were considered statistically significant, and 95% confidence intervals (CI) were reported (Kline, 2005).

Results

Skewness values ranged from -0.03 to 1.12 , and kurtosis values ranged from -1.23 to 0.42 , except for item 10 that showed $Sk=4.09$ and $Ku=18.94$. The adequacy of the data to conduct an EFA was confirmed given the results of the Kaiser–Meyer–Olkin test ($KMO=0.75$) and Bartlett's sphericity test ($\chi^2_{(66)}=707.72$; $p < 0.001$).

The polychoric correlations between the items ranged from -0.05 to 0.81 (Table 1). A parallel analysis was conducted, and the scree plot was inspected, indicating a four-factor solution.

Means, standards deviations, item-total correlations, and Cronbach's alpha if item deleted for the DMPI-R are displayed in Table 2. Item-total correlations ranged from 0.25 (item 10) to 0.63 (item 2). Cronbach's coefficient alpha would increase with the removal of item 10 (from 0.81 to 0.82).

Construct Validity

An exploratory factor analysis was computed, and a four-factor solution was obtained, explaining 65.4% of the total variance, with Factor 1—Low perceived benefit explaining 21.8%, Factor 2—Perceived socio-cultural conflict explaining 15.2%, Factor 3—Perceived pragmatic barriers explaining 14.7%, and Factor 4—Perceived inadequate knowledge explaining 13.7% of the variance. Factor loadings and communalities are presented in Table 2. Factor loadings ranged from 0.42 (item 12 – “My family would think it was unusual”) to 0.97 (item 11 – “I wonder if meditation might harm me”). Communalities ranged from 0.37 (item 12) to 0.94 (item 6).

A confirmatory factor analysis was conducted to test the adequacy of three different models in sample 2. A hierarchical model (model 1) with one second-order factor explaining the four DMPI-R factors was calculated, given that in the DMPI original version this was the suggested model structure. Fit results are displayed in Table 3. Model 1 showed a good fit to the data. Standardized regression weights ranged from 0.19 (item 10) to 0.81 (item 12).

A four-factor model similar to the one reported in the original DMPI-R version was tested (model 2) and also revealed a good fit to the data (Table 3). DMPI-R items showed standardized regression weights ranging from 0.24 (item 10) to 0.94 (item 5).

Additionally, a four-factor model removing item 10 from Factor 2—Perceived socio-cultural conflict was calculated (model 3). The removal of item 10 was based on its *Sk* and *Ku* values, on its item total correlation value and on increasing of Cronbach's alpha value if item deleted. This model showed a good fit to the data as presented in Table 3. Model's comparison through ECVI suggested that the four-factor model after removing item 10 was the one revealing the lowest value. Standardized regression weights ranged from 0.47 (item 11) to 0.94 (item 5). Subsequent analyses were conducted excluding item 10.

No sex differences were found between the DMPI-R factors: Factor 1—Low perceived benefit ($t_{(152)} = -0.95$; 95% CI: -1.77 to 0.62 ; $p = 0.342$), Factor 2—Perceived socio-cultural conflict ($U = 2,547.50$; $p = 0.170$),

Table 1 Polychoric correlation of DMPI-R 12 items (sample 2)

	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11
Item 1											
Item 2	.64										
Item 3	.53	.73									
Item 4	.6	.72	.64								
Item 5	.3	.37	.32	.29							
Item 6	.27	.35	.28	.28	.81						
Item 7	.17	.24	.28	.27	.36	.40					
Item 8	.09	.22	.31	.21	.17	.26	.75				
Item 9	.15	.40	.48	.29	.28	.33	.41	.55			
Item 10	-.07	.23	.48	.45	-.05	-.06	.24	.41	.30		
Item 11	.17	.28	.29	.47	.07	.20	.40	.36	.15	.70	
Item 12	.17	.32	.18	.34	.10	.17	.48	.38	.29	.48	.53

Table 2 DMPI-R 12 items mean (M), standard deviation (SD), corrected item-total correlations and Cronbach α if item deleted, factor loadings and communalities (h^2) ($N=154$)

Items	<i>M</i>	<i>SD</i>	<i>Corrected item-total r</i>	<i>Cronbach α if item deleted</i>	F1	F2	F3	F4	h^2
1. I prefer to be accomplishing something	3.27	1.19	.44	.80	.72				.51
2. Meditation might be boring	2.57	1.15	.62	.79	.89				.82
3. It is a waste of time to sit and do nothing	2.00	.98	.59	.79	.79				.70
4. I don't believe meditation can help me	2.23	1.17	.57	.79	.74				.73
5. I don't know much about meditation	3.54	1.16	.44	.80				.75	.68
6. I would not know if I were doing it right	3.62	1.10	.46	.80				.96	.94
7. There is no quiet place where I can meditate	2.42	1.28	.52	.79			.66		.65
8. There is never a time when I can be alone	2.08	1.18	.47	.80			.94		.88
9. I don't have time	2.40	1.23	.46	.80			.56		.43
10. I'm concerned meditation will conflict with my religion	1.17	.57	.25	.82		.76			.79
11. I wonder if meditation might harm me	1.42	.76	.38	.81		.97			.92
12. My family would think it was unusual	1.60	1.02	.35	.80		.42			.37

F1, Factor 1—Low perceived benefit; F2, Factor 2—Perceived sociocultural conflict; F3, Factor 3—Perceived pragmatic barriers; F4, Factor 4—Perceived inadequate knowledge

Factor 3—Perceived pragmatic barriers ($t_{(152)} = 1.02$; 95% CI: -0.47 to 1.48 ; $p = 0.309$) and Factor 4—Perceived inadequate knowledge ($t_{(152)} = -1.04$; 95% CI: -1.03 to 0.32 ; $p = 0.30$). There were no significant associations between the DMPI-R factors and age and years of education ($p > 0.050$) except for a negative significant

correlation between Factor 2—Perceived socio-cultural conflict and years of education ($r = -0.25$; 95% CI: -0.39 to -0.10 ; $p = 0.002$).

Table 3 Confirmatory factor analysis—goodness-of-fit indices of models 1, 2, and 3

	CMIN/df	$\chi^2_{(df)}$	<i>p</i>	CFI	TLI	RMSE	90% CI	SRMR	ECVI
Model 1	1.77	88.94 ₍₅₀₎	< .001	.95	.94	.06	[.04—.08]	.08	.63
Model 2	1.29	61.95 ₍₄₈₎	.085	.98	.98	.04	[.00—.06]	.07	.54
Model 3	1.21	46.00 ₍₃₈₎	.175	.99	.99	.03	[.00—.06]	.06	.45

Model 1, hierarchical model with one second-order factor explaining the four DMPI-R factors; *Model 2*, four-factor model; *Model 3*, four-factor model removing item 10 from factor 2; CMIN, Qui-Square/degree freedom; CFI, Comparative Fit Index; TLI, Tucker and Lewis Index; RMSEA, root mean square error of approximation; CI, confidence intervals; SRMR, standardized root mean square residual; ECVI, Expected Cross-Validation Index

Internal Consistency and Reliability Analyses

Cronbach’s alpha, McDonald’s omega, composite reliability (CR) and Average Variance Extracted (AVE) of each factor are presented in Table 3. The DMPI-R factors showed Cronbach’s alpha/Spearman-Brown coefficient values ranging from 0.63 (Factor 2—Perceived socio-cultural conflict) to 0.80 (Factor 4—Perceived inadequate knowledge). McDonald’s omega ranged from 0.75 (Factor 3—Perceived pragmatic barriers) to 0.84 (Factor 1—Low perceived benefit). The DMPI-R construct validity was further confirmed by calculating composite reliability (CR), and values ranged from 0.63 (Factor 2—Perceived socio-cultural conflict) to 0.93 (Factor 4—Perceived inadequate knowledge). Discriminant validity was assessed through the comparison of the AVE of each factor with the squared correlation between the factors. The squared correlations between the factors ranged from 0.01 to 0.13, and AVE results were higher than these squared correlations except for Factor 2—Perceived socio-cultural conflict.

Test–retest reliability with a 6-week interval was computed in a subsample of 55 participants. Dependent samples *t*-tests revealed no significant differences between the four factors in the two assessment moments: Factor 1—Low perceived benefit ($t_{(54)} = -0.36$; 95% CI: -0.84 to 0.59 ; $p = 0.723$), Factor 2—Perceived socio-cultural conflict ($W = 222.00$; $p = 0.827$), Factor 3—Perceived pragmatic barriers ($t_{(54)} = -0.32$; 95% CI: -0.80 to 0.58 ; $p = 0.754$),

and Factor 4—Perceived inadequate knowledge ($t_{(54)} = 0.74$; 95% CI: -0.28 to 0.60 ; $p = 0.460$). As an additional analysis of test–retest reliability, Pearson and Spearman correlations were calculated, and very large correlations were found for Factor 1—Low perceived benefit ($r = 0.69$; 95% CI: 0.51 to 0.81 ; $p < 0.001$), for Factor 3—Perceived pragmatic barriers ($r = 0.44$; 95% CI: 0.18 to 0.63 ; $p < 0.001$) and Factor 4—Perceived inadequate knowledge ($r = 0.67$; 95% CI: 0.48 to 0.80 ; $p < 0.001$), and a non-significant correlation for Factor 2—Perceived socio-cultural conflict ($r = 0.18$; 95% CI: -0.10 to 0.43 ; $p = 0.182$).

Concurrent Validity

Correlation coefficients between the DMPI-R factors and measures tapping other constructs were computed in a subsample of 75 participants (psychological inflexibility as measured by the AAQ-II, distress tolerance, meditation perspective). Results are displayed in Tables 4 and 5.

Factor 3—Perceived pragmatic barriers showed the higher correlation with the AAQ-II ($r = 0.31$, $p < 0.001$). No significant correlations were found between the DMPI-R Factors and the DTS-S. Concerning the questions about Perspectives on Meditation, the highest correlation was found between Factor 4—Perceived inadequate knowledge and the question “How likely are you to seek an opportunity to meditate in the near future?” ($r = -0.57$, $p < 0.001$; 95% CI: -0.71 to -0.39). DMPI-R Factor 2—Perceived

Table 4 Correlations between the DMPI-R factors, Cronbach α (samples 1 and 2), McDonald’s ω (samples 1 and 2), composite reliability (CR), and average variance extracted (AVE)

	F 1	F 2	F 3	α Sample 1	ω Sample 1	α Sample 2	ω Sample 2	CR	AVE
F 1				.84	.84	.77	.77	.84	.27
F 2	.28**			.52a	—	.63a	—	.63	.11
95% CI	0.14 to 0.43								
F 3	.19*	.21**		.75	.77	.73	.75	.87	.24
95% CI	0.07 to 0.32	0.08 to 0.33							
F 4	.36**	.12	.36**	.85a	—	.80a	—	.93	.20
95% CI	0.24 to 0.47	-0.01 to 0.24	0.24 to 0.47						

F1, Factor 1—Low perceived benefit; F2, Factor 2—Perceived sociocultural conflict; F3, Factor 3—Perceived pragmatic barriers; F4, Factor 4—Perceived inadequate knowledge; CI, confidence interval. * $p < .01$; ** $p < .001$; a. Spearman-Brown coefficient

Table 5 Zero-order correlations between the DMPI-R factors and the AAQ-II, DTS-S, and the Perspectives on Meditation questionnaire ($N=75$)

	F1 DMPI-R	F2 DMPI-R	F3 DMPI-R	F4 DMPI-R
AAQ-II	.24*	.27*a	.31**	.26*
95% CI	0.01 to 0.44	0.04 to 0.48	0.09 to 0.50	.04 to .46
DTS-S	.01	-.11a	-.11	-.01
95% CI	-0.22 to 0.24	-0.33 to 0.13	-0.33 to 0.12	-0.24 to 0.22
PM1	-.53**	-.24*a	-.38**	-.57**
95% CI	-0.68 to -0.35	-0.45 to 0.01	-0.55 to -0.17	-0.71 to -0.39
PM2	-.54**	-.16a	-.24*	-.46**
95% CI	-0.69 to -0.36	-0.38 to 0.08	-0.44 to -0.02	-0.62 to -0.26
PM3	-.47**	-.08a	-.25*	-.38**
95% CI	-0.63 to -0.27	-0.31 to 0.16	-0.45 to -0.02	-0.56 to -0.17
PM4	-.47**	-.19a	-.24*	-.32**
95% CI	-0.63 to -0.27	-0.41 to 0.04	-0.44 to -0.01	-0.51 to -0.10
PM5	.02	.05a	.17	.22
95% CI	-0.21 to 0.25	-0.18 to 0.28	-0.06 to 0.38	-0.01 to 0.42

AAQ-II, Acceptance and Action Questionnaire-II; CI, confidence interval; DMPI-R, Determinants of Meditation Practice Inventory – Review; PM1, “How likely are you to seek an opportunity to meditate in the near future?”; PM2, “How interested are you in doing meditation?”; PM3, “How interested are you in learning more about meditation?”; PM4, “To what extent do you think meditating would help you?”; PM5, “How difficult do you think it would be to learn meditation?”; DTS-S, Distress Tolerance Scale – Simon; F1, Factor 1—Low perceived benefit; F2, Factor 2—Perceived sociocultural conflict; F3, Factor 3—Perceived pragmatic barriers; F4, Factor 4—Perceived inadequate knowledge; ** $p < .001$, * $p < .050$; a, Spearman correlation

socio-cultural conflict did not show statistically significant correlations with any variable except for a medium correlation with the AAQ-II ($r=0.24$, $p < 0.05$; 95% CI: 0.10 to 0.44).

Discussion

The current study aimed to investigate the factor structure and psychometric properties of the Determinants of Meditation Practice Inventory-Revised (DMPI-R; Hunt et al., 2020) in a general population Portuguese sample (non-meditators). The DMPI-R assesses barriers to meditation being useful to identify the difficulties and misconceptions regarding meditation practices. Moreover, to our knowledge, the DMPI-R is the only self-report instrument specifically addressing obstacles and potential misunderstandings related to meditation practice. Therefore, this study allows the availability of an additional version in another language than English, promoting cross-cultural research.

The DMPI-R factor structure was investigated through exploratory factor analysis and revealed a similar structure to the one found in the original version. Additionally, a parallel analysis was conducted also pointing to the retaining of the four identified factors: Factor 1—Low perceived benefit, Factor 2—Perceived socio-cultural conflict, Factor 3—Perceived pragmatic barriers, and Factor 4—Perceived inadequate knowledge. This structure was further investigated in

a second sample, and three models were tested. Model 1 was a hierarchical model with one second-order factor explaining the four DMPI-R factors. This model definition was based on the suggested structure of the DMPI original version in which the authors (Williams et al., 2011) suggested that a total score could be computed, and higher scores would reflect higher levels of perceived barriers to meditation. This model showed a good fit to the data. Nevertheless, CFA results of the DMPI revised version (DMPI-R; Hunt et al., 2020) indicated the absence of a higher-order factor.

Therefore, a four-factor model (model 2), with the four factors correlated, was also tested, revealing a good fit to the data. Finally, a four-factor model after removing item 10 (model 3) was tested. This item removal was based on psychometric criteria but also on the item content. Item 10 addresses a potential barrier related to the possible conflict between religious beliefs and meditation practice. It may be hypothesized that growing knowledge about meditation practice, and variables such as age and years of education (the current sample participants were young adults and presented high education levels), may have weakened this misconception, leading to this item's leptokurtic distribution.

Model 3 also revealed a good fit to the data and, when compared to the previous models, showed a lower Expected Cross-Validation Index. Nonetheless, this item can be culturally sensitive, and other languages versions should investigate whether it should be maintained, rephrased, or replaced. Furthermore, this item removal implies that besides Factor

4—Perceived inadequate knowledge, one more factor (Factor 2—Perceived socio-cultural conflict) would encompass only two items. Although the recommended number of items per factor is usually three to five (MacCallum et al., 1999; Raubenheimer, 2004), Factor 4—Perceived inadequate knowledge encompasses two items with related content highly correlated with each other ($r > 0.70$) but relatively uncorrelated with the remaining items (Yong & Pearce, 2013).

Although model 3 was the one showing the best fit to the data, one may hypothesize the use of a DMPI-R global score given that model 1 also revealed a good fit and may capture a global sense of barriers to meditation practice. In fact, the original version of the DMPI (Williams et al., 2011) also pointed to a global score, and it was in the DMPI-R (Hunt et al., 2020) that the authors were not able to replicate this second-order model.

Overall, item-total correlations results further confirmed the adequacy of the items, except for item 10. Given that corrected item-total correlation may be considered one of the best item assessment methods (Zijlmans et al., 2019), once more, future studies must address the inclusion of item 10. Regarding reliability, the authors of the DMPI-R original version did not report this analysis and recommended it in further studies. Therefore, the current study adds to Hunt et al. (2020) by providing evidence of the DMPI-R factors' reliability. It is worth noting that Factor 2—Perceived socio-cultural conflict is the one showing to be lower than the recommended values (Field, 2013).

Concerning test–retest reliability, our study also adds to the one of DMPI-R original version by having studied it in a subsample of 55 participants. Findings revealed no significant differences between the DMPI-R factors in the two assessment moments. When considering correlation results between the DMPI-R factors considering the 6-weeks interval, very large correlations were found except for Factor 2—Perceived socio-cultural conflict, that revealed a small correlation. Overall, findings suggest that the DMPI-R European Portuguese version reveals good temporal stability.

The associations between the DMPI-R European Portuguese version and other constructs, such as experiential avoidance (AAQ-II), distress tolerance (DTS-S), and perspectives on meditation, were explored in a subsample of 75 participants. Although the absence of a DMPI-R similar measure does not allow to address convergent validity, the positive correlations found with experiential avoidance (as measured by the AAQ-II) suggest that barriers may be linked to the unwillingness to be in contact with internal experiences (e.g., thoughts, feelings, bodily sensations).

Regarding perspectives on meditation, the probability of meditating in the near future and the interest in practicing meditation were the ones presenting a very large association with Factor 1—Low perceived benefit and Factor

4—Perceived inadequate knowledge. These results were somehow expected, given that perceiving meditation as having no or low benefits and lacking sufficient knowledge about meditation may contribute to not being interested in practicing. This is in line with the theoretical frameworks stating that perceived benefits are relevant aspects of adopting healthy behaviors (Ajzen, 1991; Prochaska, 2013). Furthermore, there was also a large negative correlation between the likelihood of meditating in the near future and perceiving pragmatic barriers. Results also pointed that not being interested in learning more about meditation and lacking the recognition of potential benefits are related to barriers expressed by factors 1 and 4, precisely low perceived benefit and perceived inadequate knowledge. Finally, the extent to which one thinks it would be difficult to learn meditation does not seem to be associated with any of the DMPI-R factors.

No significant associations between the DMPI-R factors and distress tolerance (as measured by the DTS-S) were found in the current study. These findings were somehow similar to the ones reported by Hunt et al. (2020). Nevertheless, these authors found a significant correlation between Factors 2 (Perceived socio-cultural conflict) and 4 (Perceived inadequate knowledge) and distress tolerance, hypothesizing that not having appropriate knowledge regarding meditation and perceiving a socio-cultural conflict with meditation may lead to negative affect (Hunt et al., 2020).

Barriers to meditation did not seem different for men and women and showed no association with age and years of education. The only significant correlation found was precisely between years of education and Factor 2—Perceived socio-cultural conflict. This result was somehow expected, given that more educated participants may be more aware of the inexistence of socio-cultural conflicts with meditation practices. These findings add to the study of the DMPI-R original version by shedding light on the relationship between sociodemographic variables and barriers to meditation.

Limitations and Directions of Future Research

The current findings should be interpreted considering some limitations. The recruitment process (online survey) may encompass sampling bias, self-selection concerns, or underrepresentation of the population (e.g., excluding participants lacking access to online platforms) and therefore limits the possibility of generalizations (Wright, 2005).

Moreover, this study samples encompassed more female and single participants and relatively young individuals who were not recruited through probabilistic sampling. Therefore, future studies should be conducted in more balanced samples regarding these demographic characteristics. For example, men were underrepresented, not allowing for

measurement invariance analysis computation and properly explore differences in gender.

Regarding sensitivity analyses, this study samples showed not being able to detect correlations smaller than $r=0.23$ (sex differences), or smaller than $r=0.38$ (test–retest) and smaller than $r=0.33$ (correlations between DMPI-R factors and other measures). Thus, the correlation between Factor 2—Perceived socio-cultural conflict and years of education and the correlations with other measures revealed to be underpowered and should be inspected in future studies with larger samples. Additionally, data collection took place during the COVID-19 pandemic, and this may influence the results.

It is worth noting that the current study tried to replicate the DMPI-R original study, and self-report measures were used as the unique method for data collection, contributing to a common method bias (Podsakoff et al., 2012). Nevertheless, except for the DMPI-R and Perspectives on Meditation questions, the other two self-report instruments address different constructs (AAQ-II and DTS-S) they were presented to participants on two different pages and with clear and brief instructions. In future research, other procedures, such as including other data collection methods, temporal and/or psychological separation may be considered (Podsakoff et al., 2012). Moreover, reported effect sizes should be interpreted cautiously due to recent evidence on effect size inflation (Schäfer & Schwarz, 2019).

Although this study aimed to translate and validate the DMPI-R European Portuguese version, future research may be conducted to examine its usefulness in implementing meditation programs. These future studies may provide meditation instructors information regarding specific targets to be addressed in such programs to prevent dropouts and enhance participants' involvement. For example, using the DMPI-R after meditation programs allows assessing the usefulness of strategies implemented during the program to decrease barriers. Some misconceptions about meditation can lead to unrealistic expectations that tend to dissipate with guided meditation and monitored practice. The risk of decontextualization or disembodied use of meditation practice has been highlighted (Brito, 2014; Grossman, 2010; Mikulas, 2011). Therefore, the DMPI-R may also be used as the basis for a more in-depth discussion and clarification about meditation origins and practice.

Additionally, Britton et al. (2021) mentioned that the replacement of the passive monitoring-based method with guidelines and validating assessments specific to the risk of adverse effects or harm in meditation programs is essential. Although DMPI-R is not a specific self-report instrument to evaluate meditation harm, it is worth noting that item 11 addresses this specific concern: “I wonder if meditation might harm me”. Thus, DMPI-R can also be integrated into a previous protocol helping professors/instructors to

recognize potential risks or difficulties and maximize the safety and efficacy of meditation programs (Britton et al., 2021; Lomas et al., 2015).

To sum, the European Portuguese version of DMPI-R seems to reveal good reliability and validity as a self-report instrument to assess perceived barriers to meditation. This measure may be used in a population without meditation experience allowing facilitators/professors to work on reported barriers/difficulties, promoting motivation and tailored psychoeducation to enhance the meditation experience. This may contribute to preventing dropout in MBIs and increase in-session and between-session meditation practices.

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Author Contribution BM: study conception and design, material preparation, data collection and analysis and wrote the paper. AG: study conception and design, material preparation and analysis and collaborated in the writing and editing of the final manuscript. MC: study conception and design, material preparation and analysis and collaborated in the writing and editing of the final manuscript. JPG: study conception and design and collaborated in the writing and editing of the final manuscript.

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Data Availability All data are available at the Open Science Framework (osf.io/s3ef8/?view_only=347ef0b5b1234498b950a19cd6d79c65).

Declarations

Ethics Statement The study was approved by the ethics committee of the Faculty of Psychology and Educational Sciences of the University of Coimbra (CEDI/FPCEUC:65/1).

Informed Consent Statement Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare no competing interests.

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