



# Compassion-Based Meditation Quality Practice and Its Impact on the Positive Attitudes Toward Others

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## Abstract

**Objectives** The authors report on the initial development and validation of the Compassion Practice Quality Scale (CPQS), a measure to assess the quality of compassion-based meditation (CBM). It is conceptualized and operationalized via two factors measuring mental imagery and somatic perception/response.

**Methods** The total sample was composed of 205 university students who underwent a CBM and completed pre-test/post-test assessment of compassion and related constructs. Results from a series of preliminary psychometric analyses of the CPQS were examined, including factor analysis, internal consistency, and convergent/discriminant validity.

**Results** The data supported a 12-item and 10-item (without reference to gestures and self-instructions) CPQS of which imagery and somatic perception emerged as two significant reliable subscales, with Cronbach's alpha values of .90 and .88 respectively. Practice quality factors assessed by the CPQS correlated in expected ways with fear of compassion, imagery variables, and self-criticism, as well as predicted compassion outcome (i.e., feeling positive attitudes toward others).

**Conclusions** Our findings contribute to identifying two key components of high-quality meditation in CBM (i.e., mental imagery and somatic perception/response) for use in pedagogical development and further research and to offer a reliable self-report measure to assess them for the first time.

**Keyword** Quality practice · Compassion · Meditation · Reliability · Assessment

Compassion-based interventions (CBI) have received increasing interest in the last years (Ferrari et al., 2019; Kirby et al., 2017; Wilson et al., 2019). Evidence has shown that these interventions increase well-being and decrease psychological distress (Wilson et al., 2019), anxiety, and depressive symptoms (Kirby et al., 2017).

Different CBIs have been developed to train compassion and self-compassion to treat, for instance, fear of cancer recurrence (González-Hernández, 2018), fibromyalgia (Montero-Marín et al., 2017), paranoid ideation (Ascone et al., 2017), body dissatisfaction (Albertson et al., 2015), or borderline personality disorder (Feliu-Soler et al., 2017).

Although CBI has been intensively researched in the last years, some key aspects remain unclear. According to Kirby et al. (2017), it is still necessary to gain a deeper understanding of how these interventions function and the underlying processes that make them work (Kirschner et al., 2019). Furthermore, little is known about which facets of the interventions are producing positive outcomes. For example, the type of meditations taught or the quality of the practice are important research topics that have received an increased focus in the research of meditation (Cebolla et al., 2017; Del Re et al., 2013; Goldberg et al., 2020). In the case of mindfulness meditation, Del Re et al. (2013) pointed out that the quality of mindfulness practice defined as a balanced perseverance/resolve in (a) receptive (b) present moment

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attention, during the act of formally practicing mindfulness meditation, maybe as important as the quantity and offered a tool to help clinicians instruct their patients. These authors developed a two-factor measure of mindfulness practice quality to evaluate the impact of high/low-quality meditations on cultivating mindfulness. However, few studies have focused on the importance of practice quality and most of the mindfulness-based intervention (MBIs) studies have prioritized quantitative monitoring rather than the specific way in which meditation should be conducted, which is essential to home-practice adherence and positive outcomes (e.g., Lloyd et al., 2018). To date, despite the high amount of research developed in the last years regarding CBI, there are no available measures to assess the quality of compassion-based meditations (CBMs) and the difficulties or barriers that can arise during its practice.

The family of meditations used in CBIs is different than the one used in MBIs. According to the system developed by Dahl et al. (2015), there are three different families of meditations, based on their primary cognitive mechanisms: attentional (“practices that strengthen the self-regulation of various attentional processes, especially the ability to initiate and sustain meta-awareness”), deconstructive (“practices that use self-inquiry to foster insight into the processes of perception, emotion, and cognition”), and constructive (“strengthen cognitive and affective patterns that foster well-being, promote healthy interpersonal dynamics, strengthen a commitment to ethical values, and nurture habits of perception”) (Dahl et al., 2015). CBIs are mainly based on constructive meditations. This family of meditations uses strategies based on mental imagery, self-instructions, and gestures, aspects that should be included in the assessment of CBM quality practice. That is, meditators are usually asked to imagine and thinking of love ones, neutral people, and someone who they hate. Then, they are invited to send them good wishes repeating phrases such as “may you be free of suffering” or “may you be peaceful.” Finally, many meditations suggest to perform compassionate gestures, for example, putting the hands on the chest, to enhance physical sensations.

Mental imagery is the simulation of mental representations that subjectively have sensory properties but have no basis in current sensory stimuli (Kosslyn et al., 2001). It has been a topic of interest in the last years (Saulsman et al., 2019) and has been found to play an important role in the development and treatment of emotional disorders (Holmes et al., 2016).

Some authors have hypothesized that weak mental imagery can lead to poor compassionate imagery outcomes and can be a cause for CBI dropout (Naismith et al., 2018). In a study regarding training predictors in self-compassionate self-regulation interventions for smoking cessation, the intervention was found to reduce

smoking more rapidly in those who showed more vivid imagery during the intervention exercises (Kelly et al., 2010). Naismith et al. (2018) found that low mental imagery ability was a significant inhibitor of the generation of compassionate images and positive affect in a sample of patients diagnosed with personality disorders, and participants pointed out weak imagery ability as one of the main barriers in the CBI (Naismith et al., 2019). In another study, imagery vividness in visual and bodily sensation modalities was shown to predict compassionate affect (Naismith et al., 2019).

In terms of mental imagery and understanding its impact on CBM quality, it is interesting to consider the four different processes described by Pearson et al. (2013) and based on Kosslyn’s theory. This model provides the processes and subsystems that underlie the functioning of mental imagery following the computational approach: generation, maintenance, inspection, and transformation/manipulation of the mental images. These domains require different skills and different cognitive processes (Pearson et al., 2013). Regarding image generation, two processes have been identified: an image can be created directly from immediate perceptual information (e.g., using a mirror before doing a self-compassion meditation or observing an image before doing the compassion practice) or can be created from information previously stored in long-term memory (Pearson & Logie, 2004). In this step, the importance of the factor in CBM could be related to the lack of information to design the image to be used in the meditation. In terms of image maintenance, this is accomplished by reactivating perceptual memory representations in an object property processing subsystem (Kosslyn, 1980). Naïve meditators can show difficulties in maintaining a clear mental image for more than a few seconds (Kosslyn, 1994). The third process, image inspection, involves the ability to observe the spatial properties of a mental image. The fourth process, the transformation, and manipulation of the image (such as rotation, restructuring, or synthesis) have not been thoroughly investigated. In the case of CBM, it could be related to instructions regarding how to transform an image (imagining the person who suffers free from suffering, experiencing well-being).

Another important aspect to assess is the perspective used in mental imagery. Imagining in a first-person perspective, compared to a third-person perspective, has been shown to have a positive impact on affect (Holmes et al., 2008). The use of first-person imagery, as opposed to third-person, is related to the coherence of the image with the self, and the change of perspective (e.g., in a self-compassion meditation) could be determined by a difficulty in the construction and maintenance of the temporally extended self, like a compassionate self (Libby & Eibach, 2011). However, there is no

research regarding the perspective effect on mental imagery in CBMs.

The impact of compassionate self-instructions is also an important topic in the study of the quality of CBM practice. Luo et al. (2020) reported on the effectiveness of compassionate self-talk in generating a compassionate state and lowering pain in an experimental setting. Arimitsu and Hofmann (2015) described how compassionate thinking, compared to other cognitive strategies, was effective in the regulation of negative emotions.

Another outstanding factor is the somatosensory properties of compassion. As previously explained, compassionate affect is predicted by imagery vividness in both visual and bodily sensation modalities (Naismith et al., 2019). Mok et al. (2020) identified the importance of physical sensations on the cultivation of soothing. Przyrembel and Singer (2018) found that during CBM, participants reported feeling warmth and warm sensations in the chest and heart. We suggest that this aspect also be assessed in the quality of CBM. However, although compassionate self-touch is included in CBIs (Kirby et al., 2017), its impact has not yet been extensively researched. All these factors (i.e., mental imagery domains, compassionate self-instructions, and somatosensory properties of compassion) should be included together to study the quality of the compassion practice.

The main objective of the present preliminary study was to develop and analyze the reliability of a new measure to assess the quality of a CBM called the Compassion Practice Quality Scale (CPQS) and explore its underlying factors in a sample of university students. Two versions (12-item and 10-item) of this scale were tested; the short one did not include items referred to gestures and sentences made in specific compassion meditations. We decided to explore the structure of the CPQS without these items to facilitate the utilization of the scale in those cases in which compassion meditation does not include this performance. The investigation was designed to firstly check the efficacy of the CBM. If the underwent meditation had not been effective to enhance positive qualities toward others, state mindfulness, and positive affect, the analysis of the compassion practice quality would have been precluded. Secondly, convergent and discriminant validity was examined through the association between CPQS scores and mental imagery abilities, prospective imagery skills, self-criticism, and fear of compassion for others. Then, in given of the above-revised literature about mental imagery as a potential predictor of CBM outcomes (e.g., Naismith et al., 2018), we investigated to which extent mental imagery abilities and prospective imagery skills were significant predictors of compassion practice quality. Finally, the predictive validity of CPQS was studied.

## Method

### Participants

The total sample was composed of 205 participants who completed an online experimental task. Participants were university students from the Universidad de las Americas Puebla (México) with an average age of 19.75 ( $SD=2.49$ ), age range of 17 to 42 years. They were primarily women (61.46%) and single (93.66%). All participants were Spanish speakers, able to understand, read, and write Spanish. Participants did not present any chronic mental or psychological disorder. The minimum sample size needed ( $N=144$ ) was computed considering the rule of thumb 10:1 (participants  $\times$  items) ratio plus the 20% dropout rate (Kline, 2011).

Descriptive statistics of sociodemographic characteristics of participants are shown in Table 1. Out of all the participants, 45 participants had previous meditation experience while 160 had not.

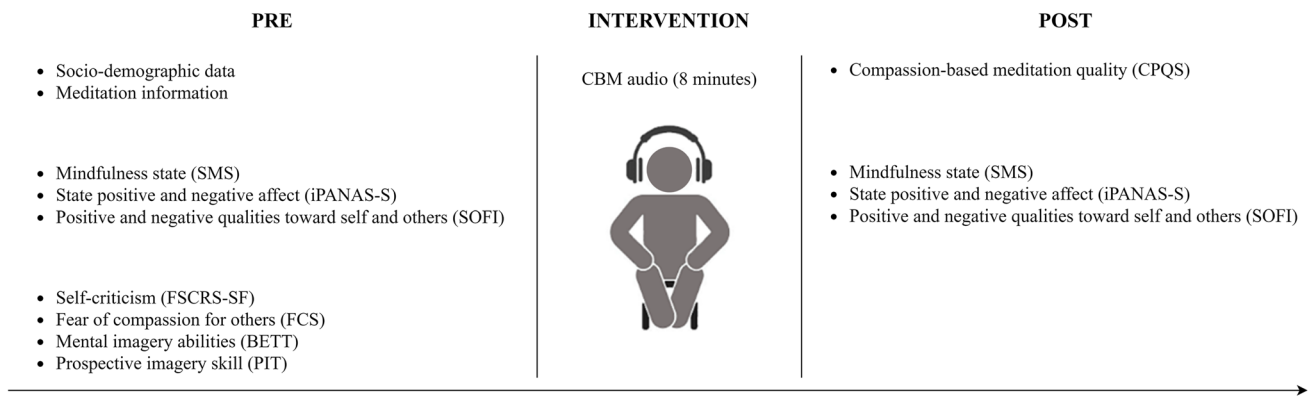
### Procedure

Students were invited to participate in an online study to assess their experiences with CBM. Those willing to participate voluntarily signed an online informed consent and accessed the online experimental task via a link. Each participant completed a baseline assessment and then accessed a guided CBM audio (8 min). After listening to the audio, they completed the post-intervention assessment (see Fig. 1).

**Table 1** Sociodemographic characteristics of participants at baseline

Baseline characteristic	Full sample	
	<i>n</i>	%
Gender		
Female	126	61.46
Male	79	38.54
Marital status		
Single	192	93.66
Married/partnered	11	5.37
Divorced/widowed	2	0.98
Highest educational level		
Middle school	2	0.98
High school/some college	43	20.98
University or post-graduate degree	157	76.59
Other	3	1.46
Employment		
Student	198	96.59
Employed	7	3.41

$N=205$ . Participants were on average 19.75 years old ( $SD=2.49$ )



**Fig. 1** Study design

CBM instruction was developed to generate compassion feelings toward the suffering of others using an image of compassion (i.e., an imaginary figure that generates genuine and clear feelings of tenderness and compassion). The CBM was composed of three phases: First, instructions focused on body awareness and mental calmness (i.e., attention to the body and breath, and breath counting). Second, instructions were aimed to (1) generate and select, (2) maintain, (3) inspect, and (4) transform and manipulate mental imagery. Concretely, participants were asked to imagine a beloved person who makes them feel a desire to take care of him/her and tenderness. Third, compassionate self-instructions and gesture indications were provided. That is, participants generated compassion for this person through wishes such as “May you be free of suffering,” “May you be well,” “May you be happy,” and “May you be in peace.” At the same time, they were asked to caress themselves, for instance touching kindly their chests. At the end of the study, a permanent link to the compassion practice was provided to the participants (<https://youtu.be/pLWYj0JvbP0>).

The current study has been approved by the Ethics Committee of the University of Valencia (Spain) and has therefore been performed following the ethical standards (World Medical Association, 2013).

## Measures

*Sociodemographic data* on age, gender, marital status, educational level, employment, religious affiliation, presence of chronic physical and/or psychological disease, and use of drugs was collected.

*Meditation information* was obtained regarding experience in meditation (yes/no question), frequency of practice (every day, three or four times a week, once a week, or less than four times per month), years of experience, and minutes on average in each practice.

*Self-criticism* was measured at baseline with the *Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form* (FSCRS-SF) (Sommers-Spijkerman et al., 2018), which contains 14 items that assess two forms of self-criticism: inadequate self (IS) and hated self (HS) and the ability to self-reassure (RS). Participants respond to a selection of statements, which seek to understand how one thinks and reacts in the face of failures or setbacks, on a 5-point Likert scale ranging from 0 (“not like me at all”) to 4 (“extremely like me”). Higher scores indicate a greater sense of inadequacy, self-hate, or self-reassurance. The FSCRS-SF had adequate test–retest reliability and satisfactory convergent validity estimates with theoretically related constructs (Sommers-Spijkerman et al., 2018). Cronbach’s  $\alpha$  in the present sample was 0.74 for IS, 0.78 for HS, and 0.71 for RS.

*Fear of compassion for others* was assessed at baseline using the subscale of fear of compassion for others (FCF-O) (10 items) from the Fear of Compassion Scale (FCS) (Gilbert et al., 2011). The items are rated on a five-point Likert scale (0 = don’t agree at all, 4 = completely agree). The FCF-O showed high internal consistency in student ( $\alpha=0.84$ ) and therapist ( $\alpha=0.78$ ) samples. Cronbach’s  $\alpha$  in the present sample was 0.79.

*Mental imagery abilities* were measured at baseline with Betts’ Questionnaire Upon Mental Imagery (BETT; Campos & Pérez-Fabello, 2005). The BETT is a 35-item self-reported questionnaire rating the vividness with which the subject can imagine an experience, with five items for each of seven sensory modalities: visual, auditory, cutaneous, kinesthetic, gustatory, olfactory, and organic. Each item is scored on a 7-point scale from 1 (“Perfectly clear and as vivid as the actual experience”) to 7 (“No image present at all; you only know that you are thinking of the object”). High scores indicate low imagery. Cronbach’s  $\alpha$  for this study was 0.86 for the gustatory and olfactory subscale, 0.71 for the kinesthetic subscale, 0.77 for the



organic subscale, 0.81 for the visual subscale, 0.73 for the auditory subscale, 0.66 for the cutaneous subscale, and 0.49 for vividness.

*Prospective imagery skill* was assessed at baseline using the Prospective Imagery Test (PIT; Stöber, 2000). The PIT is a 20-item measure of the ability to generate mental images about future events. Participants are asked to rate the vividness of prospective positive events (e.g., “You will have lots of energy and enthusiasm”) or negative events (e.g., “Someone close to you will reject you”) on a 5-point scale (1 = no image at all; 5 = very vivid). High internal consistency has been shown in previous studies for both the positive ( $\alpha = 0.89$ ) and negative ( $\alpha = 0.83$ ) events scales (41). In this study, Cronbach’s  $\alpha$  was 0.89 for the positive events subscale and 0.84 for the negative events subscale.

*Mindfulness state* was assessed at baseline and after the CBM using the State of Mindfulness Scale (SMS) (Tanay & Bernstein, 2013). The SMS is a 21-item self-reported measure that asks to what extent each sentence reflects one’s experience in the last 15 min. The SMS is composed of two factors, state mindfulness of bodily sensations ( $\alpha = 0.90$ ), and mental events ( $\alpha = 0.90$ ). Cronbach’s  $\alpha$  in the present sample was 0.88 and 0.96, respectively.

*State positive and negative affect* was measured using the International Positive and Negative Affect Schedule-Short Form (I-PANAS-SF; Thompson, 2007) at baseline and after the compassion meditation. The I-PANAS-SF—a brief version of the PANAS—is composed of 10 items, 5 items for each Positive and Negative Affect subscale. I-PANAS-SF showed acceptable psychometric properties. Cronbach’s  $\alpha$  for this study was 0.88 (positive affect) and 0.79 (negative affect).

*Positive and negative qualities toward self and others* were assessed using an adaptation of the Self-Other Four Immeasurables (SOFI) scale (Kraus & Sears, 2009) at baseline and after the compassion meditation. The SOFI is a 16-item questionnaire in which participants are asked to indicate to what extent they have thought, felt, or acted a certain way toward themselves and others during the past week on a 5-point Likert scale from “very slightly or not at all” to “extremely.” It aims to measure the application of the four immeasurable qualities based on Buddhist teachings: loving-kindness, compassion, joy, and acceptance toward both self and others. Findings supported four distinct subscales (i.e., positive qualities toward self (SOFI-PS), positive qualities toward others (SOFI-PO), negative qualities toward self (SOFI-NS), and negative qualities toward others (SOFI-NO)) with high internal consistency ( $\alpha$ -values from 0.80 to 0.86). The instructions of the SOFI were adapted from the original SOFI to focus more on the state of positive and negative qualities toward self and others in a particular moment rather than the trait or dispositional tendency to capture possible changes caused by the compassion meditation.

Cronbach’s  $\alpha$  for this study was 0.83 for SOFI-PS, 0.77 for SOFI-PO, 0.80 for SOFI-NS, and 0.72 for SOFI-NO.

*Compassion-based meditation quality* was assessed after participants completed the compassion meditation using the Compassion Practice Quality Scale (CPQS). CPQS was designed to assess the key aspects of compassion practices (e.g., mental imagery, sense of connection and warmth, compassionate phrases, and compassionate gestures). The selection of items was made by the authors (AC and DC) and reviewed by 5 meditation experts. The experts were experienced meditators and trainers of different CBIs, like Cognitive-based Compassion Training (CBCT; González-Hernández, 2018), Compassion Cultivation Training (Brito-Pons et al., 2018), or Compassion-Focused Therapy (CFT; Gilbert, 2014). After a first selection of items, a small sample of naïve CBI meditators answered the items and made suggestions; the scale was revised and presented again to the group of experts, for the final version. The final version of CPQS includes 12 items that participants score on a scale ranging between 0 and 100 indicating the percentage of the time that their experience reflects each statement (see Supplementary file 1). Higher scores indicate higher quality of practice (i.e., less practice difficulties) except for negative items (i.e., items 1, 2, 3, 4, 6, and 8). A ten-item version of the scale was also developed, excluding the items referred to compassionate self-instructions or gestures to adapt the scale to meditation instructions that do not include them (i.e., items 11 and 12).

## Data Analyses

SPSS v.26 was used for statistical analyses. Descriptive statistical analyses were performed (mean, standard deviation, and percentages) for sociodemographic data.

A paired-samples t-test was conducted to evaluate the efficacy of the compassion meditation comparing pre-test/post-test SOFI, SMS, and PANAS mean scores. Eta squared effect size was used, with cutoff values of 0.01, 0.06, and 0.14 for small, medium, and large effect sizes, respectively (Cohen, 1988). At least, a statistically significant increase in positive qualities toward others (SOFI-PO), state mindfulness (SMS), and positive affect (PANAS) with medium effect sizes would mean that the CBM was effective.

Regarding factor analysis, a principal component analysis (PCA) with oblimin rotation was used to determine the number of factors that best describes the underlying relationship between the CPQS items. Kaiser’s criterion (eigenvalue rule), Catell’s scree test (Cattell, 1966), and Horn’s parallel analysis (Horn, 1965) were checked to assist the decision concerning the number of factors to retain. To assess subscales reliability, internal consistency was assessed using Cronbach’s  $\alpha$  (Cronbach, 1951) and McDonald’s  $\omega$  (McDonald, 1999).

Pearson correlation coefficients were used to investigate convergent and discriminant validity through the relationship among BETT, PIT, FSCRS, FCF-O, and CPQS scores. Normality, linearity, and homoscedasticity assumptions were checked as preliminary analyses. Then, hierarchical multiple regression was conducted to assess the ability of the mental imagery measures (BETT, PIT) to predict factors of compassion practice quality (CPQS) after controlling for the influence of gender (0 = female; 1 = male), age, previous meditation experience (0 = no; 1 = yes), state mindfulness during the CBM (SMS post-test), self-criticism (FSCRS), and fear of compassion (FCF-O). Finally, two hierarchical multiple regressions were used to assess the validity of CPQS scores to predict positive qualities toward others (SOFI-PO post-test) after controlling for gender, age, previous meditation experience, and baseline levels (SOFI-PO pre-test). The first one included all items as independent variables in order to know which ones were the best predictors of SOFI-PO scores after the compassion-based meditation. The second multiple regression included the components of the CPQS as independent variables.

## Results

Paired-samples t-test results are shown in Table 2. There was a statistically significant increase in scores of positive qualities toward self and others (SOFI), state mindfulness (SMS), and PANAS-positive affect subscale. The eta squared statistic indicated moderate and large effect sizes. These results suggested that the CBM was effective.

Table 3 shows the pattern and structure matrix for PCA with oblimin rotation of two-factor solutions of the CPQS items. Upon close inspection, the correlation revealed the

presence of many coefficients of 0.3 and above. The Kaiser–Meyer–Olkin value was 0.88, exceeding the recommended value of 0.6 (Kaiser, 1974) and Bartlett’s Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix ( $p < 0.001$ ).

PCA revealed the presence of 2 components with eigenvalues exceeding 1, explaining 41.83% and 24.13% of the variance. An inspection of the scree plot revealed a clear break after the second component. Using the scree test, it was decided to retain two components for further investigation. This was further supported by the results of parallel analysis, which showed only two components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (12 variables  $\times$  205 respondents). There was a weak negative correlation between the two factors ( $r = -0.24$ ). According to these results and the content of the items, the two factors can be used as separate scales and were labeled “imagery” and “somatic perception” of compassion. The imagery and somatic scales had Cronbach’s alpha values of 0.90 and 0.88 and McDonald’s  $\omega$  values of 0.90 and 0.89 respectively, indicating good internal consistency.

Two items (item 11 and item 12) of the somatic factor referred to gestures and sentences made in specific compassion meditations, such as the ones used in this study. PCA with oblimin rotation was repeated without items 11 and 12. This resulted in a 10-item scale with six imagery items and four somatic items. The pattern matrix (Table 3) showed a separation of the imagery and somatic subscales. All items scored above 0.68 on their respective factors. The somatic scale (without items 11 and 12) had a Cronbach alpha value of 0.82 and a McDonald  $\omega$  value of 0.83, indicating good internal consistency.

**Table 2** Results of paired-samples t-test examining differences between pre-test/post-test

	Pre-test		Post-test		$t_{(204)}$	$p$	$\eta^2$
	$M$	$SD$	$M$	$SD$			
<b>SOFI</b>							
Positive self	13.46	3.43	14.72	3.71	-6.85	.000	0.19
Positive other	14.18	3.09	15.19	3.60	-4.92	.000	0.11
Negative self	6.79	3.14	6.29	3.24	2.61	.010	0.03
Negative other	5.92	2.39	5.76	2.87	0.89	.376	0.00
<b>SMS</b>							
Mindfulness of mind	45.23	13.75	55.76	13.49	-9.61	.000	0.31
Mindfulness of body	18.51	5.79	21.71	5.65	-6.58	.000	0.18
Total	63.74	18.79	77.47	18.64	-8.99	.000	0.29
<b>PANAS</b>							
Positive affect	14.43	4.76	16.04	4.94	-6.14	.000	0.16
Negative affect	8.49	3.60	7.96	3.93	2.07	.040	0.02

SOFI, Self-Other Four Immeasurables; SMS, State Mindfulness Scale; PANAS, Positive and Negative Affect Schedule

**Table 3** Results from a principal components analysis of the compassion meditation perceived quality scale

	Component matrix		Pattern coefficients		Structure coefficients		Communalities	Item-total correlation
	1	2	1	2	1	2		
<b>12-item CPQS</b>								
Factor 1: Imagery								
Item 2: Image creation	.72	.50	<b>.88</b>	.01	<b>.88</b>	-.20	.77	.80
Item 1: Image inspection	.58	.58	<b>.85</b>	.15	<b>.81</b>	-.05	.68	.72
Item 4: Image transformation	.72	.46	<b>.85</b>	-.03	<b>.85</b>	-.23	.73	.78
Item 6: Vividness	.69	.46	<b>.83</b>	-.01	<b>.83</b>	-.21	.69	.74
Item 3: Image sustainment	.74	.41	<b>.82</b>	-.09	<b>.84</b>	-.29	.71	.76
Item 8: Self-criticism	.62	.33	<b>.68</b>	-.08	<b>.70</b>	-.25	.49	.59
Factor 2: Somatic								
Item 12: Self-reassurance gestures	-.65	.54	-.02	<b>.84</b>	-.22	<b>.85</b>	.72	.75
Item 5: Warmth	-.61	.54	.00	<b>.81</b>	-.22	<b>.81</b>	.66	.71
Item 11: Compassionate self-instructions	-.65	.50	-.06	<b>.80</b>	-.26	<b>.82</b>	.67	.72
Item 9: Comfort	-.58	.53	.01	<b>.79</b>	-.18	<b>.79</b>	.62	.69
Item 10: Sympathy	-.70	.43	-.14	<b>.78</b>	-.33	<b>.81</b>	.68	.72
Item 7: Presence	-.45	.55	.12	<b>.73</b>	-.06	<b>.70</b>	.50	.58
<b>10-item CPQS</b>								
Factor 1: Imagery								
Item 2: Image creation	.83	.28	<b>.88</b>	.01	<b>.88</b>	-.19	.77	.80
Item 4: Image transformation	.82	.25	<b>.85</b>	-.02	<b>.85</b>	-.20	.73	.72
Item 1: Image inspection	.73	.38	<b>.84</b>	.14	<b>.81</b>	-.05	.68	.78
Item 3: Image sustainment	.82	.19	<b>.83</b>	-.07	<b>.84</b>	-.26	.71	.74
Item 6: Vividness	.80	.23	<b>.83</b>	-.03	<b>.83</b>	-.21	.69	.76
Item 8: Self-criticism	.68	.16	<b>.69</b>	-.06	<b>.70</b>	-.22	.49	.59
Factor 2: Somatic								
Item 9: Somatic	-.43	.72	.00	<b>.84</b>	-.19	<b>.84</b>	.70	.69
Item 5: Warmth	-.44	.71	-.02	<b>.83</b>	-.20	<b>.84</b>	.70	.68
Item 7: Presence	-.29	.71	.11	<b>.78</b>	-.06	<b>.76</b>	.59	.57
Item 10: Sympathy	-.55	.60	-.17	<b>.76</b>	-.34	<b>.80</b>	.68	.65

N=205. The extraction method was principal components with an oblique (direct oblimin) rotation. Factors loadings above .30 are in bold emphasis. For 12-item CPQS, factors mean scores were 403.94 (SD = 137.49) and 402.57 (SD = 133.52) respectively. For 10-item CPQS, factor 2 mean score was 262.80 (SD = 92.19)

**Table 4** Correlations for CPQS, BETT, PIT, FSCRS, and FCS subscales

Variable	BETT <sup>a</sup>					PIT			FSCRS			FCS		
	Gustatory and olfactory	Kinesthetic	Organic modality	Visual	Auditory	Cutaneous	Vividness	Positive imagery	Negative imagery	IS	HS	RS	FCS	FCF-O
<b>CPQS</b>														
1. Image inspection	-0.18**	-0.16*	-0.09	-0.17*	-0.14*	-0.19**	-0.22**	0.15*	-0.10	-0.03	-0.12	0.05	-0.12	-0.12
2. Image creation	-0.14	-0.14*	-0.16*	0.19**	-0.13	-0.12	-0.18**	0.22**	0.04	0.03	-0.08	0.13	-0.14*	-0.14*
3. Image sustainment	-0.27**	-0.14*	-0.17*	-0.27**	-0.19**	-0.21**	-0.24**	0.21**	-0.12	-0.10	-0.20**	0.16*	-0.13	-0.13
4. Image transformation	-0.11	-0.09	-0.14*	-0.22**	-0.06	-0.12	-0.19**	0.22**	-0.07	-0.07	-0.13	0.14	-0.21**	-0.21**
5. Warmth	-0.13	-0.16*	-0.17*	-0.24**	-0.25**	-0.11	-0.20**	0.26**	-0.02	-0.10	-0.20**	0.32**	0.02	0.02
6. Vividness	-0.20**	-0.12	-0.16*	-0.19**	-0.11	-0.18**	-0.19**	0.20**	-0.04	-0.09	-0.19**	0.18**	-0.17*	-0.17*
7. Presence	-0.16*	-0.08	-0.09	-0.17*	-0.25**	-0.17*	-0.10	0.11	-0.01	-0.05	-0.11	0.12	0.01	0.01
8. Self-criticism	-0.06	-0.07	-0.14*	-0.13	-0.07	-0.04	-0.07	0.13	-0.07	-0.15*	-0.14*	0.07	-0.26**	-0.26**
9. Comfort	0.01	-0.05	-0.06	-0.18**	-0.13	-0.05	-0.10	0.15*	-0.06	-0.07	-0.12	0.20**	-0.07	-0.07
10. Sympathy	-0.22**	-0.18**	-0.23**	-0.26**	-0.29**	-0.13	-0.23**	0.18*	0.04	0.03	-0.05	0.08	-0.09	-0.09
11. Compassionate self-instructions	-0.16*	-0.14*	-0.09	-0.26**	-0.27**	-0.12	-0.21**	0.18*	-0.10	-0.10	-0.18**	0.19**	-0.07	-0.07
12. Self-reassurance gestures	-0.13	-0.13	-0.08	-0.28**	-0.23**	-0.14*	-0.17*	0.23**	-0.05	-0.10	-0.18**	0.22**	-0.09	-0.09
Factor 1: Imagery	-0.19**	-0.15*	-0.18*	-0.24**	-0.14*	-0.15*	-0.22**	0.23**	-0.07	-0.08	-0.18*	0.15*	-0.21**	-0.21**
Factor 2: Somatic	-0.17*	-0.15*	-0.15*	-0.29**	-0.29**	-0.16*	-0.21**	0.23**	-0.04	-0.08	-0.18*	0.24**	-0.06	-0.06

*MQP*, Meditation Practice Quality; *BETT*, Betts' Questionnaire Upon Mental Imagery; *PIT*, Prospective Imagery Task; *FSCRS*, Forms of Self-Criticizing/Attacking & Self-Reassuring Scale; *IS*, Inadequate Self; *HS*, Hated Self; *RS*, Reassured Self; *FCS*, Fear of Compassion Scale; *FCF-O*, fear of compassion for others

\*  $p < .05$  (2-tailed)

\*\*  $p < .01$  (2-tailed)

<sup>a</sup>High score indicate low imagery vividness and vice versa



Pearson product-moment correlations are shown in Table 4. There was a medium negative correlation between all mental imagery abilities (BETT) scores and the CPQS image sustainment item, with high levels of vividness through all sensory modalities being associated with high perceived ease to sustain the mental image during the meditation. Moreover, there was a medium negative correlation between the BETT-visual subscale scores and the CPQS items and factors (except for the self-criticism one), with high levels of vividness through the visual sensory modality being associated with high levels of perceived quality of the self-compassion meditation in both imagery and somatic perception.

Table 5 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, fear of compassion for others, self-criticism, state mindfulness (post-test score), mental imagery abilities, and prospective imagery skill scores on the imagery subscale

**Table 5** Regression coefficients of socio-demographics, FCF-O, FSCRS, SMS, BETT, and PIT scores on the image factor of CPQS

Scales	Model				
	$\beta$	<i>t</i>	<i>p</i>	R <sup>2</sup>	$\Delta R^2$
Step 1				.09	.09**
Constant		1.99	.047		
Gender	-0.15	-2.19	.030		
Age	-0.02	-0.29	.775		
Previous meditation experience	0.05	0.66	.508		
Step 2				.23	.14***
SMS-mind	0.47	3.41	.001		
SMS-body	-0.19	-1.38	.169		
FSCRS-hated self	-0.04	-0.38	.706		
FSCRS-inadequate self	0.08	0.83	.409		
FSCRS-reassured self	-0.07	-0.83	.407		
FCF-O	-0.19	-2.68	.008		
Step 3				.29	.05
BETT-gustatory and olfactory	-0.10	-1.12	.265		
BETT-kinesthetic	0.07	0.71	.476		
BETT-organic modality	-0.08	-0.90	.371		
BETT-visual	-0.06	-0.78	.436		
BETT-auditory	0.06	0.69	.491		
BETT-cutaneous	0.03	0.36	.723		
BETT-vividness	-0.07	-0.92	.361		
PIT-positive imagery	0.22	2.52	.013		
PIT-negative imagery	-0.14	-1.77	.078		

FCF-O, fear of compassion for others; FSCRS, Forms of Self-Criticizing/Attacking and Self-Reassuring Scale; SMS, State Mindfulness Scale; BETT, Betts' Questionnaire Upon Mental Imagery; PIT, Prospective Imagery Task

\*\* *p* < .01

\*\*\* *p* < .001

(factor 1) of CPQS. Gender, age, and previous meditation experience were entered at step 1, explaining 8.8% of the variance in perceived quality of compassion mediation practice,  $F(3, 188) = 6.08, p = 0.001$ . At step 2, state mindfulness (mind and body subscales), self-criticism, and fear of compassion for other scores were entered and explained 14.4% of the variance,  $F(9, 182) = 6.14, p < 0.001$ . Finally, after entering the mental imagery abilities and prospective imagery skill scores at step 3, the total variance explained by the model as a whole was 28.7%,  $F(18, 173) = 3.87, p < 0.001$ . In the final model, gender ( $\beta = -0.15, p = 0.030$ ), fear of compassion ( $\beta = -0.19, p = 0.008$ ), state mindfulness (mind;  $\beta = 0.47, p = 0.001$ ), and positive prospective imagery ( $\beta = 0.22, p = 0.013$ ) measures were statistically significant.

Table 6 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, fear of compassion for others, self-criticism,

**Table 6** Regression coefficients of socio-demographics, FCF-O, FSCRS, SMS, BETT, and PIT scores on the somatic factor of CPQS

Scales	Model				
	$\beta$	<i>t</i>	<i>p</i>	R <sup>2</sup>	$\Delta R^2$
Step 1				.02	.02
Constant		0.59	.551		
Gender	0.06	0.88	.379		
Age	0.02	0.23	.816		
Previous meditation experience	-0.07	-1.12	.264		
Step 2				.34	.32***
SMS-mind	0.55	4.38	.000		
SMS-body	-0.05	-0.43	.669		
FSCRS-hated self	0.03	0.31	.754		
FSCRS-inadequate self	0.04	0.46	.643		
FSCRS-reassured self	0.04	0.48	.629		
FCF-O	-0.09	-1.06	.289		
Step 3				.40	.06*
BETT-gustatory and olfactory	-0.02	-0.23	.822		
BETT-kinesthetic	0.13	1.38	.169		
BETT-organic modality	-0.07	-0.88	.380		
BETT-visual	-0.11	-1.61	.109		
BETT-auditory	-0.15	-1.81	.072		
BETT-cutaneous	0.14	1.63	.104		
BETT-vividness	-0.14	-1.83	.069		
PIT-positive imagery	0.16	2.09	.038		
PIT-negative imagery	-0.10	-1.34	.183		

FCF-O, fear of compassion for others; FSCRS, Forms of Self-Criticizing/Attacking and Self-Reassuring Scale; SMS, State Mindfulness Scale; BETT, Betts' Questionnaire Upon Mental Imagery; PIT, Prospective Imagery Task

\* *p* < .05

\*\* *p* < .01

\*\*\* *p* < .001

state mindfulness (post-test score), mental imagery abilities, and prospective imagery skill scores on the somatic subscale (factor 2) of CPQS. Gender, age, and previous meditation experience were entered at step 1, explaining 2.2% of the variance in perceived quality of compassion meditation practice,  $F(3, 188) = 1.39, p = 0.246$ . At step 2, state mindfulness (mind and body subscales), self-criticism, and fear of compassion for others scores were entered and explained 31.8% of the variance,  $F(9, 182) = 10.41, p < 0.001$ . Finally, after entering the mental imagery abilities and prospective imagery skill scores at step 3, the total variance explained by the model as a whole was 40.3%,  $F(18, 173) = 6.48, p < 0.001$ . In the final model, the factor mind of the SMS ( $\beta = 0.52, p < 0.001$ ) and positive prospective imagery ( $\beta = 0.16, p = 0.038$ ) were statistically significant.

Table 7 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, pre-test positive qualities toward others subscale, and CPQS items scores on post-test positive qualities toward others subscale. Socio-demographics and pre-test positive qualities toward others scores were entered at step 1, explaining 39% of the post-test positive qualities toward others scores. After entering the CPQS items in step 2, the total variance explained by the model was 54.70%,  $F(16, 188) = 14.20, p < 0.001$ . Thus, CPQS items explained an additional 15.7% of the variance in post-test positive qualities toward others scores after controlling for

gender, age, previous meditation experience, and pre-test scores,  $R$  squared change = 0.157,  $F$  change (12, 188) = 5.43,  $p < 0.001$ . In the final model, the warmth item ( $\beta = 0.19, p = 0.012$ ), self-criticism item ( $\beta = 0.18, p = 0.009$ ), and self-reassurance gestures item ( $\beta = 0.22, p = 0.009$ ) made a unique statistically significant contribution.

In a parallel hierarchical multiple regression, CPQS subscale scores were included at step 2 instead of single items. After entering the imagery and somatic perception factors at step 2, the total variance explained by the model was 47.60%,  $F(6, 198) = 31.84, p < 0.001$ . Thus, CPQS factors explained an additional 10.1% of the variance in post-test positive qualities toward other scores after controlling for pre-test scores,  $R$  squared change = 0.10,  $F$  change (2, 201) = 18.63,  $p < 0.001$ . In the final model, imagery ( $\beta = 0.17, p = 0.002$ ) and somatic perception factors ( $\beta = 0.25, p < 0.001$ ) made a unique statistically significant contribution.

### Discussion

The current study analyzed a scale to measure the quality of compassion-based meditations (CBM) operationalized via two factors measuring imagery and somatic perception/response in a sample of university students. The impact of this construct on the efficacy of CBM to promote changes of positive attitudes toward others and its relationship with the

**Table 7** Regression coefficients of socio-demographics, pre-test SOFI-PO, and CPQS items scores on post-test SOFI-PO

Scales	Model			R <sup>2</sup>	ΔR <sup>2</sup>
	β	t	p		
Step 1				.39	.39***
Constant		2.32	.021		
Gender	0.06	1.17	.243		
Age	-0.09	-1.77	.079		
Previous meditation experience	-0.01	-0.22	.830		
Pre-test SOFI-PO	0.52	9.52	.000		
Step 2				.55	.16***
1. Image inspection	0.10	1.24	.217		
2. Image creation	0.04	0.55	.581		
3. Image sustainment	0.01	0.16	.876		
4. Image transformation	0.06	0.72	.473		
5. Warmth	0.19	2.54	.012		
6. Vividness	-0.15	-1.93	.055		
7. Presence	-0.05	-0.73	.465		
8. Self-criticism	0.18	2.63	.009		
9. Comfort	0.01	0.14	.890		
10. Sympathy	-0.13	-1.65	.101		
11. Compassionate self-instructions	0.06	0.75	.453		
12. Self-reassurance gestures	0.22	2.64	.009		

SOFI, Self-Other Four Immeasurables. Items 1, 2, 3, 4, 6, and 8 have been reversed

\*\*\*  $p < .001$

ability to imagine vividly, fear of compassion, state mindfulness, and dispositional self-criticism were investigated too.

Concerning the developed measure of CBM quality, the Compassion Practice Quality Scale (CPQS), the data support its reliability and confirm a two-factor structure solution for both 12- and 10-item versions. Thus, these factors constitute independent subscales which preclude the calculation of a CPQS total score. Both are separate components of compassion practice quality. The first of the two underlying components was labeled “imagery.” It captured the ability of participants to create, inspect, sustain, and transform a vivid mental image of a person they would take care of and for whom they desire well-being and non-suffering, which is consistent with the domains for mental imagery of Pearson et al. (2013). Moreover, it contains a self-criticism aspect which reflects judgment because of the difficulty to feel compassion for this person.

The second component was labeled “somatic perception” and included compassion phenomena referred to warmth, comfort, sympathy, presence, self-reassurance gestures, and compassionate self-instructions. This factor captures the somatosensory component of compassion practice and is also in line with previous studies which gave importance to the somatic aspects of compassion (Jakubiak & Feeney, 2016; Mok et al., 2020; Naismith, Kerr, et al., 2019; Przyrembel & Singer, 2018).

Together, these factors give hints regarding what intervenes in the generation process of a compassionate state during meditation. They involve the essence of CBM given how it is linked to mental imagery and a self-focused kindness and warmth experience (Gilbert, 2009a). Therefore, we suggest that these factors be used as key components to define and understand the compassion practice quality. We proposed that compassion practice quality is related to the person’s experience during the compassion meditation and, specifically, it refers “to what extent a meditator is able to produce mental imagery (in terms of generation, maintenance, inspection, and transformation/manipulation of the mental images) and activate the somatosensory component of compassion to evoke and sustain a compassionate state.” It is important to note that, according to this, low compassion practice quality may be linked to difficulties in these two factors, which should be considered during the pedagogy of compassion in the context of CBI.

Mental imagery is the backbone of CBM techniques, which harnesses its cognitive and physiological influence to help patients stimulate affiliative emotions (Gilbert, 2009b). In CBI exercises such as the ones used in this study, the practitioner must generate compassion feelings by imagining a person and wishing that positive events occur to him/her (Gilbert, 2014). Thus, the found relationship between the practice’s high quality and high vividness of the positive future events image for this person makes great sense. Besides, feeling

fear of compassion for others is directly correlated with low quality in meditation, especially with the imagery component, which suggests that this variable challenges the mental imagery process as well as self-criticism does (Gilbert et al., 2006). Furthermore, there was an association between high self-criticism and low meditation quality. Gilbert et al. (2006) found that there was a self-criticism tendency related to difficulties in the generation of soothing mental images. This is in line with previous findings which showed that high self-critics report negative experiences and respond negatively to CBIs due to the difficulty to attribute positive characteristics to the compassionate image (Duarte et al., 2015). Self-criticism and fear of compassion are two related constructs (Gilbert et al., 2012) which seem to inhibit compassion-focused imagery outcomes, as Naismith et al. (2018) described in a borderline personality disorder sample.

Furthermore, the ability to imagine vividly, self-criticism, fear of expressing compassion for others, and state of mindfulness predicted a great part of the CBM quality. Previous findings regarding meditators’ experience show that compassion practitioners struggle with imagery experience during meditation due to the difficulty to generate and focus on clear images, which, in turn, lead them to feel negative affect (McEwan & Gilbert, 2016). Fear of compassion for others also independently predicts the imagery component. Considering that mental images are generated by memories (Pearson & Logie, 2004), this result could be related to the concept that individuals who fear compassion could perceive it as a threat source by remembering aversive emotional past situations (Kirby et al., 2019). Finally, results suggest that women are more likely to experience a good quality of practice, attending to the imagery component. Future studies are needed to explore gender differences in compassion practice quality.

Mindfulness is part of the first steps in CBIs to enhance attention and insights in the following stages (Gilbert, 2014). Experienced CBM practitioners show high levels of image maintenance and visuospatial performance, thus suggesting mindfulness training as the way to improve these cognitive processes (Kozhevnikov et al., 2009). Concretely, state mindfulness predicts reappraisal (Garland et al., 2015), which is one of the main processes in constructive meditations, such as CBM (Dahl et al., 2015). In the present study, mindful attention to mental events independently predicted practice quality related to imagination and somatic processes. It seems that the deliberate attention to the present moment mental events helps the practitioner to visualize/imagine a person. Meanwhile, paying attention to mental events in this way may induce reappraisal too, which is associated with an emotional response perceived in the body and is in consonance with top-down emotion generation (McRae et al., 2012).

Practice quality assessed by the CPQS significantly explained the increase in compassion outcome (i.e., positive qualities toward others) after the compassion meditation. Concretely, two independent predictors of this outcome were the warmth and kind sensations toward the object of compassion and the performance of caresses during the CBM. The model pointed out that induction of warmth is an independent and significant predictor of compassion state at the end of the meditation, even more than sympathy. Compassion is a multi-component process which consists of recognizing, empathizing, and tolerating the suffering of others while the observer feels motivated to act and alleviate it, understanding that it is universal and shared by all human beings (Strauss et al., 2016). Thus, empathy, i.e., feeling a shared emotion with someone, or rather emotional contagion is essential in the process to achieve compassion and the associated positive feelings, such as kindness and warmth (Singer & Klimecki, 2014). These results highlight the incorporation of gestures (i.e., caresses) in the compassion meditations as a useful stimulus which may participate in the tolerating/reassuring component of the compassion process.

### Limitations and Future Research

Our preliminary findings offer a reliable self-report measure for the quality of CBMs, the CPQS, which require further testing. First, although several constructs related to compassion have been explored in this study (e.g., positive and negative attitudes toward others, self-criticism, and fear of compassion for others), additional well-established compassion-specific measures, such as the Sussex-Oxford Compassion Scales (Gu et al., 2020), should be included in the future to deepen understanding of the impact of the current quality components on compassion outcomes. Related to this, the high number of questionnaires answered by the participants might have been a confounding variable. Moreover, further research on other aspects or constructs related to compassion that may explain compassion practice quality such as attachment styles (Montero-Marín et al., 2017), empathy (Davis, 1980), body awareness (Price & Thompson, 2007), or decentering skills (Soler et al., 2014) is needed. Second, findings from this study should be interpreted with caution and concerning to the sample studied (i.e., Mexican university students). Although the sample provided statistical power and reduced bias, its homogeneity compromises the generalization of the results. Further studies with other samples and contexts are needed to confirm these encouraging and exploratory findings, especially to check if the constructs are comparable across groups (e.g., between meditators and non-meditators or high and low self-critical participants) and to confirm the factor structure of the scale, meanwhile, investigating the potential presence of an overarching latent

construct. Third, meditation experience and frequency of practice were not included in the analysis due to the reduced size of the meditator sample ( $N=45$ ) which may bias results by not considering meditation information. Given the number of studies highlighting the potential of mediation indicators such as experience and frequency of practice on meditation outcomes (e.g., Campos et al., 2016; Cebolla et al., 2017; Soler et al., 2014), it is important to explore its possible influence in the compassion practice quality. Little is known about how practice dosage influences the quality of meditation (Del Re et al., 2013), and even less is known in this regard in terms of compassion practice quality. Fourth, the type of compassion practice (i.e., self-compassion or compassion for others) and its impact on quality of practice was not explored in this study which was based on a compassion for others meditation. Finally, the lack of the control group and the small time frame between measures compromise results about the impact of meditation over the pre-post scores and, therefore, findings should be interpreted with caution for state outcomes (i.e., mindfulness and SOFI) due to possible overlapping between the “state” across the two time points.

Thus, future studies should explore whether compassion practice quality is affected by a CBI, and how the variability predicts the response and efficacy of the intervention. Another interesting topic could be to study whether compassion practice quality is affected depending on whom is directed toward (i.e., toward oneself or toward others)—and what happens if the other who suffers is a relative, a stranger, or an enemy. In this line, confirmatory factor analysis to test measurement invariance across meditators and non-meditators is needed. Furthermore, some authors have made the distinction between implicit and explicit compassion practices. Even though they show similar efficacy, this distinction should be considered given that implicit compassion does not use mental imagery (Brito-Pons et al., 2018).

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**Author Contributions** A.C. and D.C. developed the Compassion Practice Quality Scale and designed the study. A.C. and D.C. developed the compassion-based meditation which was recorded by A.C. E.G-H. and R.D-P. performed the recruitment. J.N. conducted the formal analyses and wrote the results section. A.C., J.N., and D.C. wrote the original draft. E.G-H., R.D-P., R.H., and R.B. collaborated in the writing and editing of the final manuscript.

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**Data Availability** The data that support the findings of this study are available on request from the corresponding author.

## Declarations

**Ethics Statement** The current study has been approved by the Ethics Committee of the University of Valencia (Spain).

**Informed Consent Statement** Freely given, informed consent to participate in the study was obtained from participants.

**Conflict of Interest** The authors declare no competing interests.

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