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Exploratory effects of structured mindfulness programs (MBCT and MBSR) on posttraumatic growth, alexithymia and type D personality

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Abstract

Background: Mindfulness practices might become an important intervention strategy, but also a prevention approach, with regular practice helping people to cope with adverse daily situations, adopting more conscious attitudes and behaviors, responding, instead of reacting. This exploratory study aimed to evaluate the effectiveness of two of the main structured mindfulness-based interventions (MBCT, Mindfulness-Based Cognitive Therapy program; and MBSR, Mindfulness-Based Stress Reduction program), applied to adults, to assess their impact on psychological variables.

Method: Participants completed self-report measures concerning posttraumatic growth, alexithymia, dispositional mindfulness, and type D personality, in an initial moment (before the program; n=126), in a second moment (at the end of the program; n=44), and in a third moment (four months after the end of the program; n=13), thus fulfilling a 6-month study protocol.

Results: The results showed a significant increase in the levels of positive psychological changes after a traumatic event, alexithymia, dispositional mindfulness, and type D personality, after participating in these programs and later, 4 months after the programs have ended, only for the MBCT group.

Conclusions: Despite some limitations inherent to this type of study, that future studies should consider, the results reinforce the value of conducting and comparing the efficacy of different mindfulness programs, in isolation, or complementing individual therapy.

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1. Introduction

In everyday life, many people commonly express the need to turn off the mental autopilot (Paulson et al., 2013). Is it possible that those who say so, are actually aware of the tools that are available to achieve what they wish? The truth is that to turn off this autopilot requires observing the language and stories of the mind in a curious and patient way, focusing on what is around, with an attitude of non-judgment (Paulson et al., 2013). Currently, third generation cognitive-behavioral therapies (CBT) have emerged considerably, showing robust results regarding their application in various populations and in multiple contexts, with effects on the reduction of cognitive rumination, social avoidance, worry, anxiety and depressive symptoms (e.g., Fumero et al., 2020; Kriakous et al., 2021; Querstret et al., 2020). Consecutively, these approaches are associated with psychological benefits not only in terms of feelings of clarity, ability to regulate emotions and mood, cognitive flexibility, facilitating a higher emotional balance (Hayes & Feldman, 2004) but also in terms of perceived control (e.g., Myles et al., 2020, 2021; Myles & Merlo, 2022a). Within these therapies, mindfulness-based interventions (MBIs) have proven to be quite useful and reliable.

Mindfulness has its origins in Buddhist meditative practices and, therefore, the term mindfulness itself is the English translation of the word "*Satī*" in Pali, language of the ancient religious texts of southern Buddhism (Anālayo, 2010). The meaning of mindfulness practices varies from author to author, but it points to: keeping in mind what happens; recognition; awareness intentionality of the mind; vigilant mind; attention; alertness; lucid mind; self-awareness (Sillifant, 2007). However, although mindfulness is a Buddhist practice, it does not imply that people who want to enjoy the benefits associated with this practice must adopt Buddhist traditions, as this is not the purpose of the practice (Baer & Krietemeyer, 2006). According to Kabat-Zinn (1994), pioneer leader of mindfulness in health, mindfulness consists in the awareness that results when we focus our attention on the experience, in an intentional way, consciously directing to its aspects. The subject chooses to be fully attentive to the experience, in the present moment, and when the mind wanders to thoughts about the past or the future, or to other elements, attention is brought, again, to the present moment, with an attitude acceptance, without judging the thoughts that arise (or the experience has it is/was). Mindfulness practices, as a mental training, aim to teach people to observe their thoughts, being able to differentiate favorable from harmful thoughts, both possible and valid, helping them, also to deal with and to regulate negative emotions (Kabat-Zinn, 1990). This practice can be carried out in two ways: (a) formally, with mindfulness meditation being performed through specific and planned exercises/practices, in different postures, in a lying or sitting position; and

(b) informally, by applying the skills acquired in daily life, paying attention throughout the day to what is happening at the present moment (e.g., when showering, brushing teeth, walking, etc.) (Roemer & Orsillo, 2010). Regardless of the way, the practices have as central factors the awareness of breathing and four fundamental anchors: body, sensations, emotions, and thoughts (Kabat-Zinn, 2013).

According to some authors, mindfulness practices might become an important intervention strategy, but also a prevention approach, with regular practice helping people to cope with adverse daily situations, adopting more conscious attitudes and behaviors, responding, instead of reacting. Although being more frequently described as a trait (Brown & Ryan, 2004), mindfulness as a state, through its cultivation, can be developed, based in meditative practices, namely through interventions associated with positive results in terms of physical, psychological, and emotional well-being, helping to promote better self-regulation and general well-being (Baer, 2003; Siegel et al., 2009).

Different programs, such as Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990, 1994) and Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2002), were developed with the purpose of managing mental and physical health and increasing the well-being of the individuals (Crane et al., 2017). MBSR was developed by Jon Kabat-Zinn (1982, 1990) to support individuals with stress and chronic pain conditions. This program is based on a theoretical educational component, focusing on stress and on strategies usually used to cope with stress (usually reactivity patterns), as well as three practical components: yoga; different seated meditations; and the body scan (Baer, 2003; Grossman et al., 2004). In turn, the MBCT was developed by Teasdale, Segal, and Williams (1995), initially designed to prevent relapses in people with an history of depression (Segal et al., 2002). Therefore, this training has two purposes: (1) developing capacities of symptoms recognition associated with depressive relapse; and (2) promote ways of decreasing the probability of entering in characteristic mental states, namely depressive ruminative patterns (Ospina et al., 2007).

Both programs comprise mindfulness exercises/practices that are taught to the participants, having an eight-week duration (plus a retreat day), with sessions having a mean duration of two and a half hours, once a week, based on the original protocol of Kabat-Zinn (2003). These programs have, effectively, been seen as beneficial, when conducted individually or in a group format, having impact in various mental and physical problems/issues. For example, a recent meta-analysis showed the efficacy of MBCT in preventing relapses of major depressive disorder (Kuyken et al., 2016). Another study demonstrated the efficacy of MBSR in reducing psychological suffering, in clinical and nonclinical samples (Carmody & Baer, 2009). Khoury et

al. (2013), conducted a study in which it was possible to conclude that MBSR was effective in reducing depressive symptomatology, stress, anxiety, and burnout, as well as in increasing quality of life. Teixeira and Pereira (2009), in a review paper, concluded that the MBSR in oncological settings contributes beneficially to the reduction of stress, anxiety and depression levels, and other psychological symptoms associated, as well as to an increasing in self-reported tranquility. In 2018, it was demonstrated the efficacy of a combined intervention with MBCT and MBSR, in reducing symptoms associated with common psychiatric disorders (Hedman-Lagerlöf et al., 2018), as well as reducing anxiety, burnout, depression, stress and anguish, and, consecutively, in increasing well-being and mindfulness, in health professionals (Lomas et al., 2018). More recently, it was possible to observe the beneficial results of these programs in students from secondary school, by decreasing depression, anxiety, and stress symptoms (Halladay et al., 2019). Moreover, considering self-reported insomnia, mindfulness approaches can be considered a potential and important intervention. In fact, a cluster of sleep-disturbed individuals with higher mindfulness traits has been identified, being probable that these subjects might be highly receptive to third-wave CBTs for insomnia (Marques et al., 2020). Also recently, some authors have highlighted that behavioral activation is an effective addendum to mindfulness interventions (Myles & Merlo, 2022b).

1.1 The present study

The present exploratory study aimed to assess the efficacy of two MBIs (through the participation in an MBCT or an MBSR 8-week program) in psychological variables, such as posttraumatic growth, alexithymia, dispositional mindfulness, and type D personality. Measurements were conducted in three moments: pre-intervention (M0), post-intervention (M1), and at a four months follow-up (M2). Based on previous studies (e.g., Fumero et al., 2020; Querstret et al., 2020), it is hypothesized that participants in both programs would report more psychological growth (associated to adverse events), less alexithymia indicators, higher dispositional mindfulness, and less negative affectivity over time.

2. Methods

2.1 Participants

A total of 126 participants were recruited. From these, 111 were women and 15 were men, with a mean age of 40.20 (SD = 10.68). More than a half were married (51.6%), most had a higher degree (91.2%) and were employed (79.4%). From the 126 participants, 31 (25.2%) were attending psychological support, 16 (13%) psychiatric support and 11 (8.9%) were having both.

Participants were assigned to one of two groups, MBCT (n = 106; 84.1%) or MBSR (n = 20; 15.9%).

From all the participants, only 44 completed the assessments at the end of the program (38 in the MBCT group and 6 in the MBSR group). Completers (n = 44) and drop-outs (n = 82) did not differ significantly at pre-intervention on the dependent variables, except in one posttraumatic growth (PTG) variable, personal strength [$t(124) = -2.68, p < .01$], with drop-outs presenting higher levels of personal strength (M = 2.75; SD = 1.54) than completers (M = 2.00; SD = 1.43).

At M2, from the 44 participants, only 19 filled the self-report measurements (completing a 6-month study protocol). From these participants, three were excluded for answering repeatedly to the same moment of assessment, as well as other three participants that were excluded for not filling the protocol in some of the moments.

Thus, the final sample was composed by 13 participants. Eleven participated in MBCT, the majority were women (91%) with ages ranging from 17 to 62 years old ($M = 42.09$; $SD = 11.95$). Most of them were married or were living in a consensual union (64%), having a high level of education (73%), and being employed (64%). Two participants in the MBSR ($M\ age = 35.50$ years old; $SD = 2.12$) were single, had higher education and postgraduation, and were employed. The sample sociodemographic characteristics are presented in Table 1.

Table 1. Sociodemographic characteristics of the participants (n = 13).

Variables		MBCT (n=11)		MBSR (n=2)	
Age		M=42.09; SD=11.95		M=35.50; SD=2.12	
	Min-Max	17 – 62		34 – 37	
Gender	Male	1	9.1	1	50
	Female	10	90.9	1	50
Marital status	Married/Consensual union	7	63.6	—	—
	Single	2	18.2	2	100
	Divorced/Separated	1	9.1	—	—
	Widow	1	9.1	—	—
Academic Qualifications	Secondary School	3	27.3	—	—
	Higher education	8	72.7	1	50
	Postgraduation	—	—	1	50
Professional Situation	Student	1	9.1	—	—
	Employed	7	63.6	2	100
	Unemployed	2	18.2	—	—
	Retired	1	9.1	—	—

Note. M = Mean; SD = Standard Deviation; n = number of participants; Min = Minimum; Max = Maximum

More than 50% of the MBCT participants were in psychotherapy, were not taking psychiatric medication, nor reported any physical condition. From those on medication, 60% reported taking antidepressants and benzodiazepines. Considering MBSR participants, only one participant was in psychotherapy, suffering from a recent physical problem (Table 2).

Table 2. Clinical characteristics of the participants (n = 13)

Variables		Sample			
		MBCT (n=11)		MBSR (n=2)	
Psychotherapeutic Follow up	No	7	63.6	1	50
	Psychiatry	3	27.3	—	—
	Psychology	—	—	1	50
	Psychiatry and Psychology	1	9.1	—	—
Duration Follow up	2 months	1	25	—	—
	12 months	—	—	1	100
	24 months	1	25	—	—
	60 months	2	50	—	—
Psychiatric Medication	Yes	5	45.5	—	—
	No	6	54.5	2	100
Medication type	Antidepressant / benzodiazepines	3	60	—	—
	Benzodiazepines	1	20	—	—
	Antidepressant	1	20	—	—
Meditation	No	5	45.4	—	—
	Mindfulness	4	36.4	2	100
	Other	2	18.2	—	—
Recent physical problem	No	9	81.8	1	50
	Yes	2	18.2	1	50

Note. M = Mean; SD = Standard Deviation; n = number of participants

2.2 Measures

Posttraumatic Growth Inventory – short form (PTGI-SF; Cann et al., 2010); Portuguese versions: (1) PTGI, Teixeira & Pereira, 2013; (2) PTGI-SF, Lamela et al., 2014). This self-report measure aims to assess positive psychological changes perceived by the subject, related to an adverse/traumatic event lived by him/her. In this study, a short version was used, composed by 10 items (two items for each domain) (instead of the 21 items from the original version). Items were answered in a 6-point Likert scale (1 – "did not experience this change as a result of the event", and 6 – "experienced this change in a very high level as a result of the event"). Perceived positive changes can be defined in five domains (relating to others, new opportunities,

personal strength, spiritual change, appreciation of life) that represent the dimensions in which the subjects present changes, in terms of posttraumatic growth, after dealing with an adverse (or traumatic) event. The short version presented a Cronbach alpha of 0.88 (Lamela et al., 2014).

Toronto Alexithymia Scale (TAS-20; Bagby, Taylor & Parker, 1994; Portuguese version by Veríssimo, 2001). This self-report measure includes 20 items answered in a 5-point Likert scale (1 – "strongly disagree" to 5 – "strongly agree"), evaluating three alexithymia dimensions: difficulty identifying feelings, difficulty describing feelings, externally oriented thought. Higher scores represent higher levels of alexithymia. The Portuguese version (Veríssimo, 2001) presented the following Cronbach alphas: total scale (0.75), difficulty identifying feelings (0.79), difficulty describing feelings (0.57), and externally oriented thinking (0.65).

Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008; Portuguese version by Teixeira et al., 2017). This scale includes 20 items divided into two dispositional mindfulness constructs: (1) Acceptance, the attitude of non-judgment of the events; and (2) Awareness, the evaluation and capacity of the subject to perceive and having notion of his/her thoughts, feelings, and bodily sensations, in the present. Items are answered in a 5-point Likert scale, 1 corresponding to "never" and 5 to "always". Since the scale assesses the capacity of focusing in the present moment, higher values correspond to a higher capacity from the subject to focus on the present moment. The Portuguese version (Teixeira et al., 2017) presented Cronbach alphas higher than 0.70 (0.77 for awareness, and 0.85 for acceptance).

Distress Scale (DS-14; Denollet, 2005; Portuguese version by Rocha, 2015). This 14-item scale classifies type D personality, divided into two subscales: Negative affectivity (propensity to experience negative emotions) and Social inhibition (manifestation of emotions in social involvements) (Dennolet, 2005). The items are answered in a 5-point Likert scale (0 corresponding to "false", and 5 to "true"). Results equal or higher than 10 points reflect strong type D personality characteristics. The Portuguese version (Rocha, 2015) presented Cronbach alphas of 0.51 (negative affectivity) and 0.77 (social inhibition).

The internal consistency values (Cronbach´s alphas and the Guttman split half, for dimensions with two items) of the present study are presented in Table 3. According to Nunnaly and Bernstein (1994) an instrument as appropriate reliability if the Cronbach alpha is higher than 0.70, but for samples with less than 50 subjects, a Cronbach alpha above 0.50 is acceptable (Davis, 1964, cited by Peterson, 1994).

Table 3. Internal Consistency of the Variables, in the Three Moments.

		M0 (n = 126)	M1 (n = 44)	M2 (n = 13)
PTGI-SF[b]	Relation with others[a]	0.53	0.82	0.76
	New possibilities[a]	0.66	0.90	0.90
	Personal strength[a]	0.62	0.98	0.82
	Spiritual change[a]	0.86	0.90	0.85
	Appreciation of life[a]	0.65	0.75	0.87
	Total	0.89	0.97	0.95
TAS-20[c]	Difficulty in identifying feelings	0.86	0.75	0.91
	Difficulty in describing feelings	0.65	0.85	0.75
	Externally oriented thinking	0.60	0.60	0.48
	Total	0.85	0.84	0.87
PHLMS[d]	Awareness	0.83	0.85	0.87
	Acceptance	0.58	0.80	0.85
DS-14[e]	Negative affectivity	0.90	0.86	0.82
	Social inhibition	0.23	0.47	0.15
	Total	0.80	0.81	0.70

Note. [a]Guttman split half; [b]Posttraumatic Growth Inventory – short form; [c]Toronto Alexithymia Scale; [d]Philadelphia Mindfulness Scale; [e]Distress Scale; M0 = pre-intervention; M1 = post-intervention; M2 = follow-up.

2.3 Procedure

This is an exploratory study, since it explores a theme less considered in the scientific literature, the effectiveness of MBIs (MBCT and MBSR); and it has a longitudinal nature, with three moments of assessment. After asking for permission to the authors of the measures and having their consent, the self-report scales and a short sociodemographic and clinical questionnaire was filled out, voluntarily, by the participants, using the online platform Google Forms. Primarily, informed consent was obtained from all the participants, with all the ethical and deontological principles, concerning research projects in Psychology being followed in all the institutions.

Programs took place in various Portuguese institutions, being guided by certified MBCT and MBSR teachers. The programs followed the original protocol in terms of duration and structure: eight weeks, group intervention, one session per week with a duration of two and a half hours. Each session focused a certain theme. For a better understanding of the programs and of its contents, the themes of each session, is presented below:

MBCT Program. Session 1 – How to turn off the automatic pilot; Session 2 – Deepening self-awareness; Session 3 – Returning to the present; Orienting the scattered mind; Session 4 – Recognizing difficult emotions; Session 5 – Accepting and letting go; Allowing; Session 6 – Thoughts are not facts; Relating with thoughts; Session 7 – Taking better care of yourself; Establishing a new relation with yourself; Session 8 – Opening to life; Remaining aware/mindful.

MBSR Program. Session 1 – Introduction to mindfulness meditation; Session 2 –Perception: ways of seeing/working with obstacles; Session 3 – The power of being in the present: mindfulness of breath and body; Session 4 – Learning about stress/about reactivity patterns to stress; Session 5 – Coping with stress, using mindfulness to respond, instead of reacting; Session 6 – Stressful Communication; Session 7 – Learning to take care of myself; Session 8 – Keeping the practice of mindfulness alive.

Beyond the sessions, the programs implied a daily and personal practice, with the invitation to keep a daily log, reading and visualization of videos, as well as the practice of learned meditation exercises.

2.4 Data analysis

Data analyses were conducted using an IBM software program, the Statistical Package for the Social Sciences (SPSS), version 26. Descriptive analysis of the sociodemographic and clinical variables was performed. The subscale social inhibition (DS-14) was not used due to its low reliability ($\alpha = 0.28$). The significance of the efficacy of the programs on different psychological variables and their evolution in the three moments were assessed with a one mixed repeated measures ANOVA (paired samples), and only the 13 participants that completed the 3 assessments were included. The method assumption, namely the matrix sphericity of variances-covariances was assessed through Mauchly test. When the sphericity assumption was not verified, the degrees of freedom of the F statistic were corrected, multiplying them by the Épsilon factor. For samples of small dimension, the most appropriate is the Épsilon of Greenhouse-Geisser (Marôco, 2018). We used paired-samples *t* tests to compare M0 with M1 and M1 with M2, regarding the MBCT program, and the difference between means was calculated (given the small sample size of the MBSR group we did not proceed with these analyses). For this purpose, M0 and M1 included the 38 participants that completed the 2 moments of assessment, and the M0 and M2 and M1 and M2 comparison included only the 11 participants. We considered a *p*-value significance of 0.05.

3. Results

Group comparison in the three moments (M0, M1 and M2)

One mixed repeated-measures ANOVA was conducted to compare the scores in psychological variables (PTGI-SF, TAS-20, PHLMS e DS-14), comparing the groups, in the three moments (M0, M1 e M2) (see Figures 1-6).

PTGI-SF. In *Relating to Others* there were no significant differences in the three moments [F (1, 13)=0.72, p>0.05, ηp2= 0.06], and these differences did not depend on the program being considered [F (1, 13)=1.47, p>0.05, ηp2= 0.12]. Regarding *New Possibilities* there were no significant differences in the three moments [F (2, 22)=3.38, p>0.05, ηp2= 0.03] and these differences did not depend on the program being considered [F (2, 22)=0.40, p>0.05, ηp2= 0.03]. In *Personal Strength* there were no significant differences in the three moments [F (2, 22)=1.05, p>0.05, ηp2= 0.09] with these differences not being dependent on the program that the participants attended to [F (2, 22)=1.91, p>0.05, ηp2= 0.15]. In *Spiritual Change*, there were no significant differences in the three moments [F (1, 14)=0.61, p>0.05, ηp2= 0.05] and these differences did not depend on the program attended [F (1, 14)=1.46, p>0.05, ηp2= 0.12]. In *Appreciation of Life*, there were no significant differences between the three moments [F (2, 22)=0.08, p>0.05, ηp2= 0.01] and these differences did not depend on the program that the participant attended to [F (2, 22)=0.08, p>0.05, ηp2= 0.01]. Considering the total score, there were no significant differences in the three moments [F (2, 22)=0.49, p>0.05, ηp2= 0.04] and these differences did not depend on the program that the participant had enrolled in [F (2, 22)=1,04, p>0.05, ηp2= 0.09].

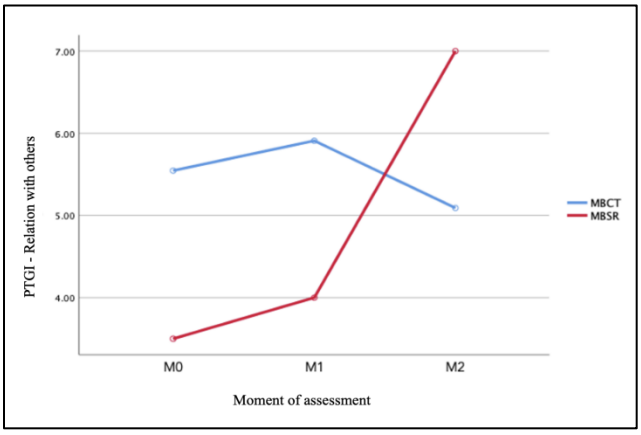

Figure 1. Results in relation with others (PTGI) in the three moments of assessment in the two groups

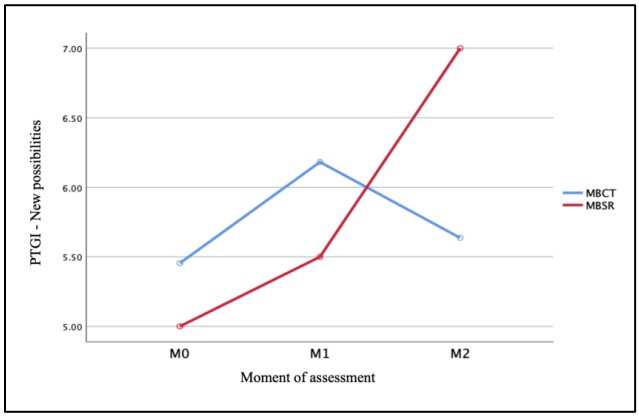

Figure 2. Results in new possibilities (PTGI) in the three moments of assessment in the two groups

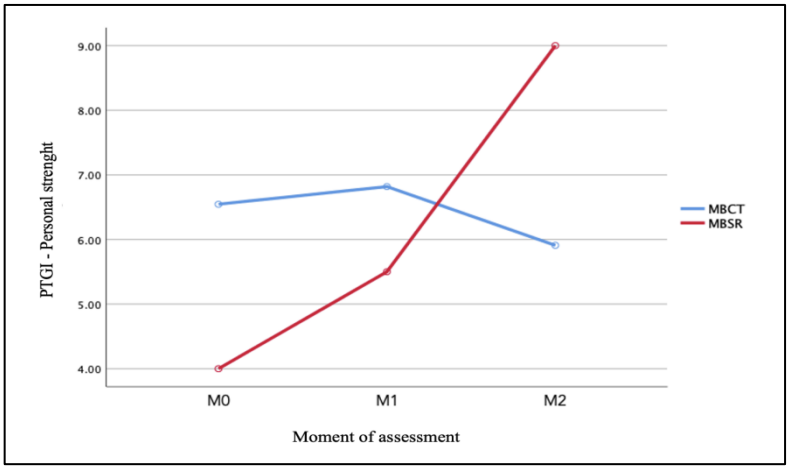

Figure 3. Results in personal strength (PTGI) in the three moments of assessment in the two groups

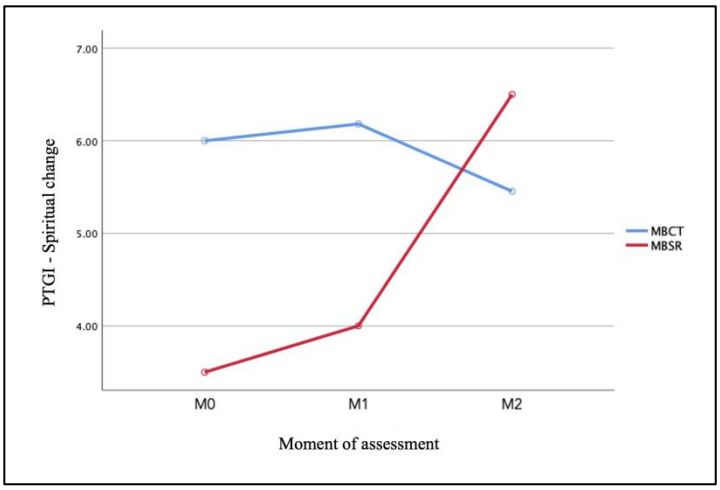

Figure 4. Results on spiritual change (PTGI) in the three moments of assessment in the two groups

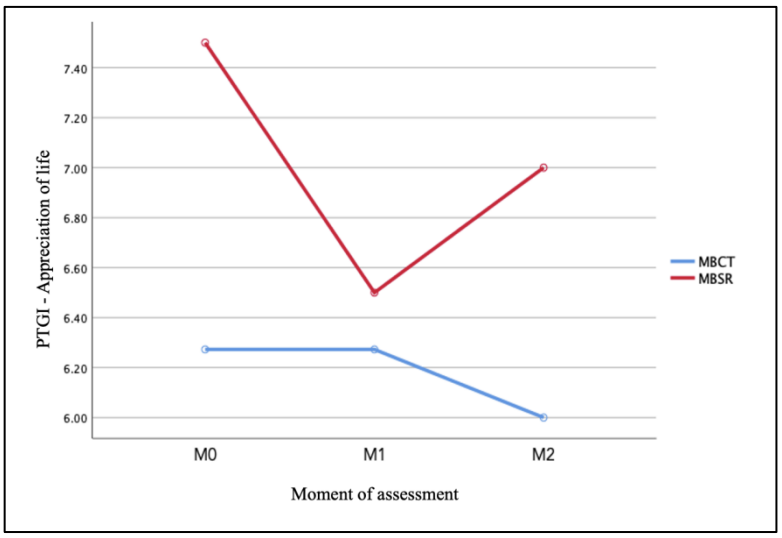

Figure 5. Results of appreciation of life (PTGI) in the three moments of assessment in the two groups

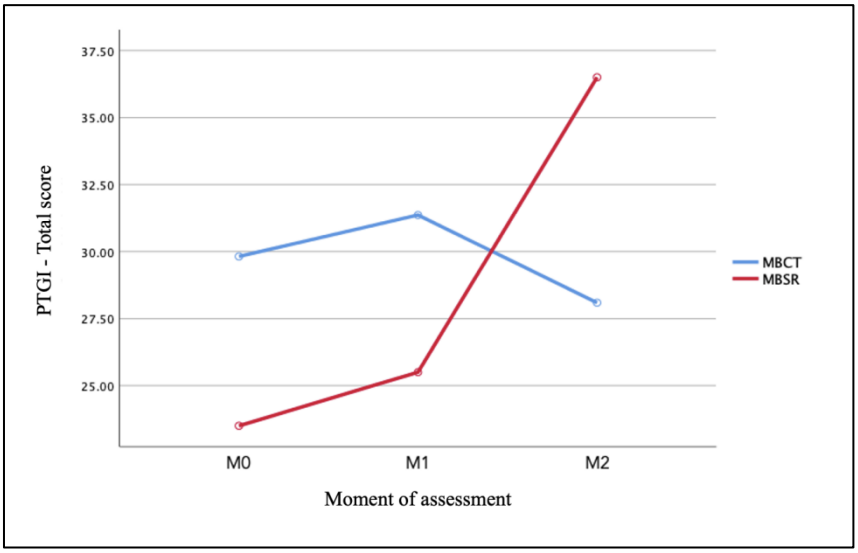

Figure 6. Results from PTGI total score in the three moments of assessment in the two groups

Summarizing, there were no significant differences in PTG dimensions and total score over time in any group.

TAS-20. Concerning *Difficulty in Identifying Feelings*, there were no significant differences between the three moments [F (2, 22)=0.77, p>0.05, ηp2= 0.06] and these differences did not depend on the program that the participant attended [F (2, 22)=0.91, p>0,05, ηp2= 0.08]. Regarding *Difficulty in Communicating Feelings*, there were no significant differences between the three moments [F (2, 22)=0.95, p>0.05, ηp2= 0.08] and these differences did not depend on the program the participant had enrolled in [F (2, 22)=0.33, p>0.05, ηp2= 0.03]. Concerning *Externally Oriented Thinking*, there were no significant differences between the three moments [F

(2, 22)=2,10, p>0.05, ηp2= 0.16] and these differences were not dependent on the program the participant attended [F (2, 22)=0.47, p>0.05, ηp2= 0.04]. Finally, concerning *total score* there were no significant differences between the three moments [F (2, 22)=1.78, p>0.05, ηp2= 0.14] and these differences did not depend on the program that the participant attended to [F (2, 22)=0.53, p>0.05, ηp2= 0,05] (see Figures 7-10).

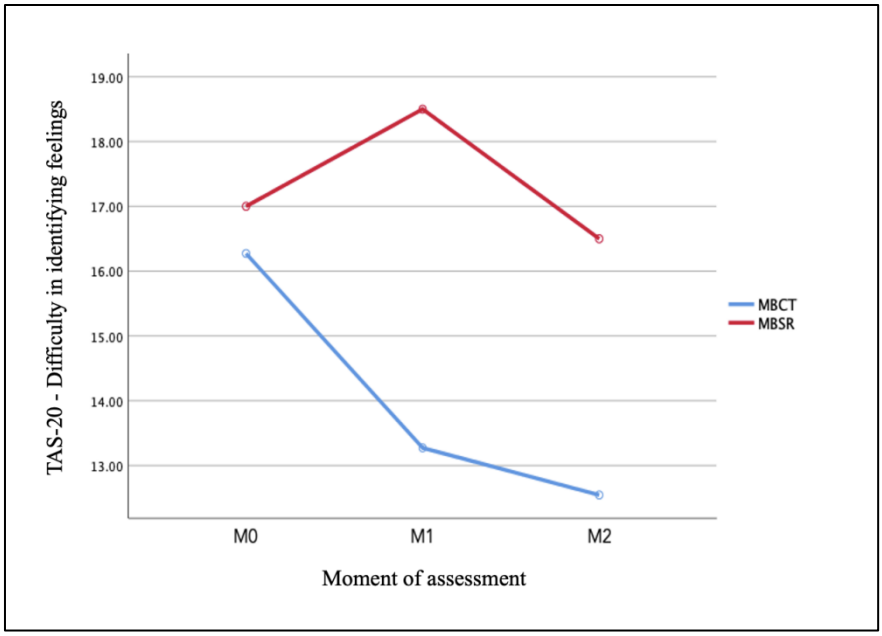

Figure 7. Results from difficulty in identifying feelings (TAS-20) in three moments of assessment in the two groups

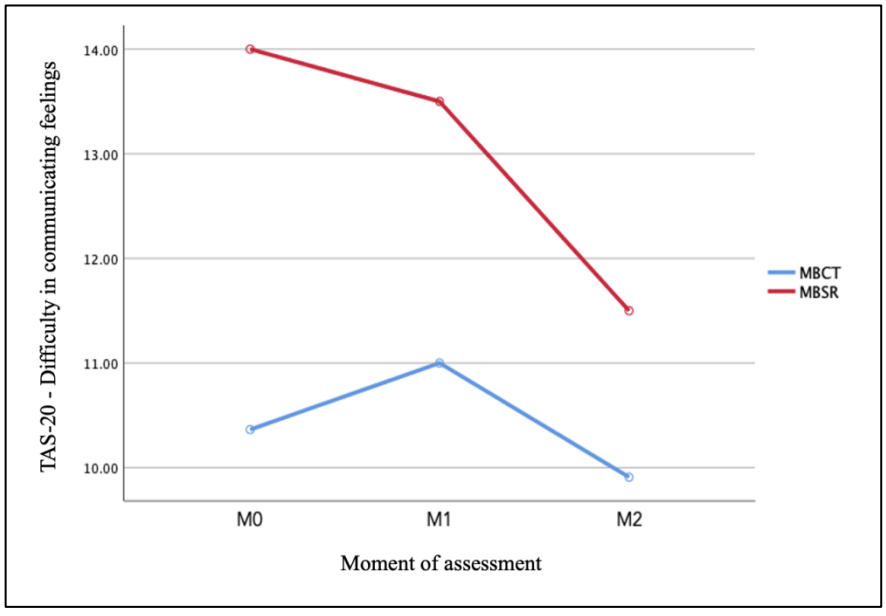

Figure 8. Results from difficulty in communicating feelings (TAS-20) in the three moments of assessment in the two groups

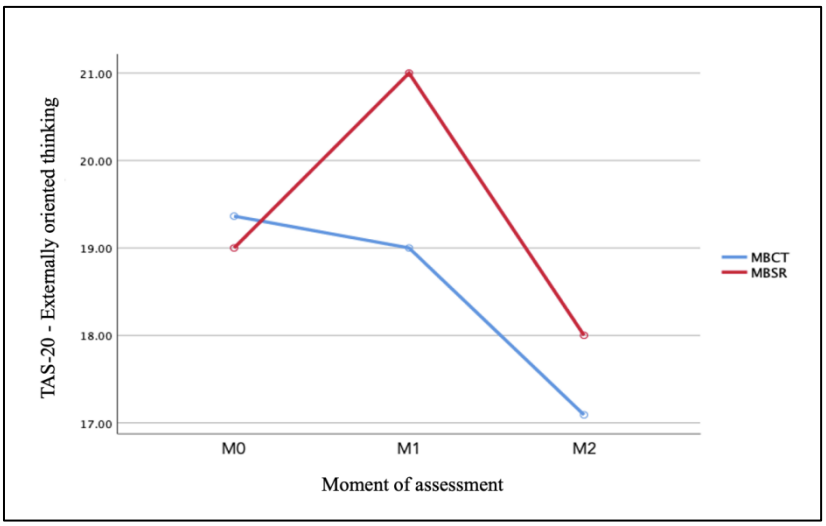

Figure 9. Results from the subscale externally oriented thinking (TAS-20) in the three moments of assessment in the two groups

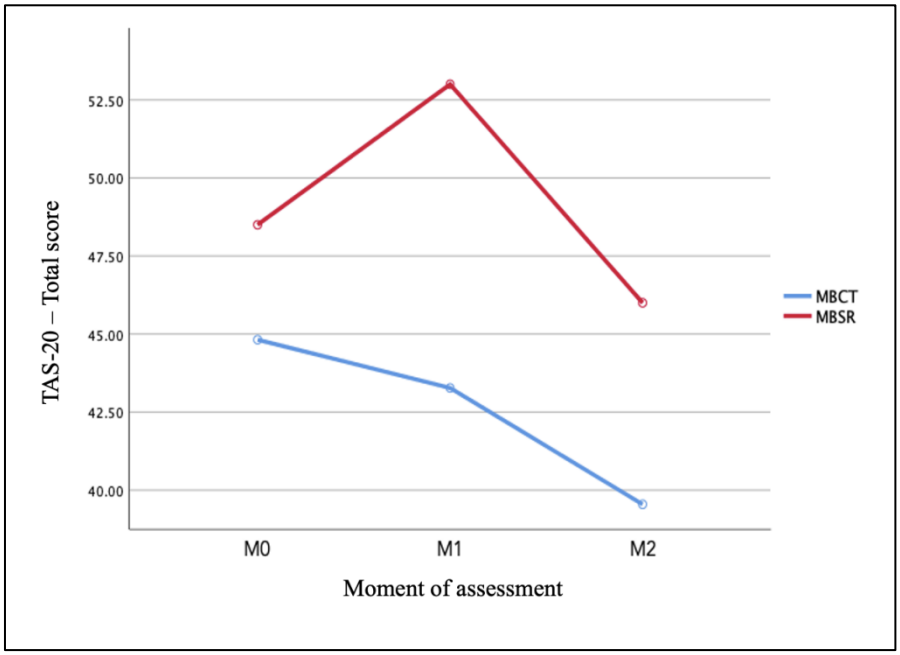

Figure 10. Results from the TAS-20 total score in the three moments of assessment in the two groups

In sum, there were no significant differences in alexithymia dimensions and total score over time in any group.

PHLMS. Regarding the *Awareness* subscale, there were no significant differences among the three moments [F (1, 13)=3.47, p>0.05, ηp2= 0.24] and these were not dependent on the program that the participant attended to [F (1, 13)=0.58, p>0.05, ηp2= 0.49]. Regarding *Acceptance*, no significant well-being were identified among the three moments [F (2, 22)=2.36,

p>0,05, ηp2= 0.18], and these differences did not depend on the program that the participant attended to [*F* (2, 22)=0.72, *p*>0.05, ηp2= 0.06] (see Figures 11 and 12).

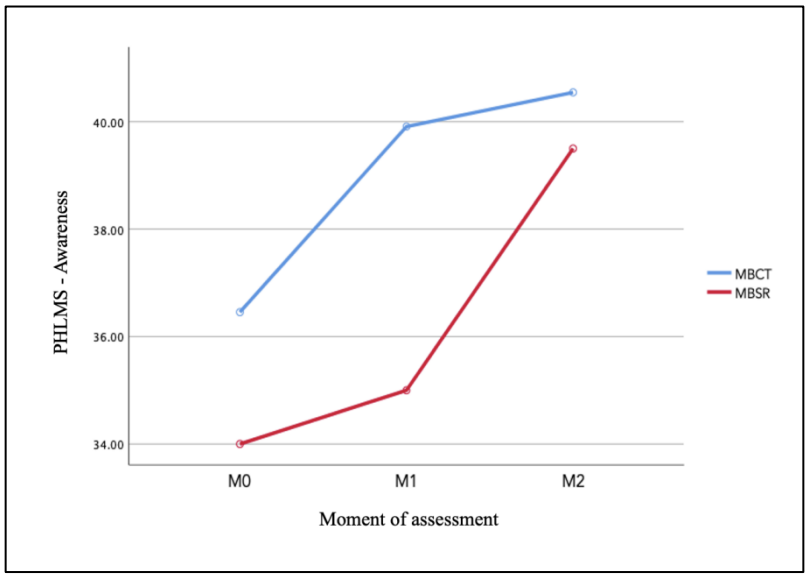

Figure 11. Results of awareness (PHLMS), in three moments of assessment in the two groups

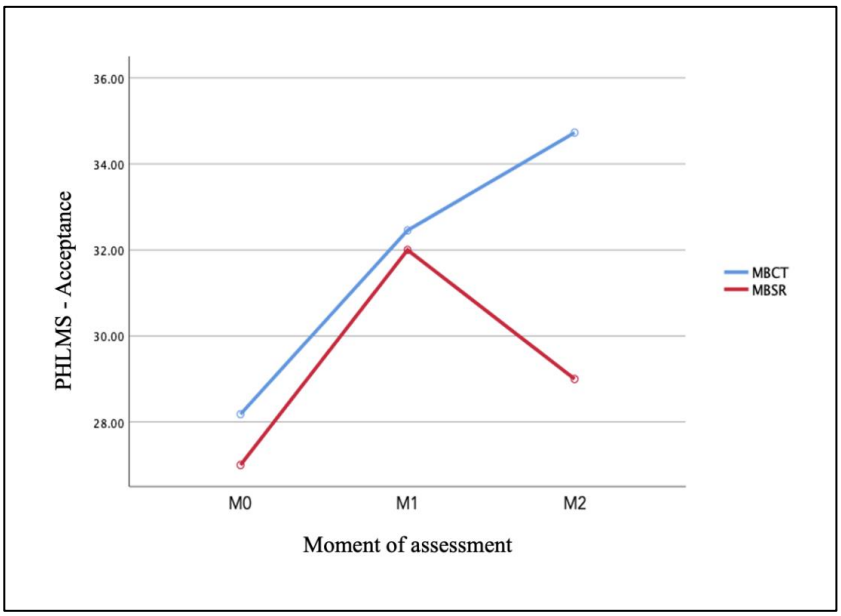

Figure 12. Results of acceptance (PHLMS) in the three moments of assessment in the two groups

DS-14. Considering *Negative Affectivity*, there were no significant differences between the three moments [*F* (2, 22)=1.87, *p*>0,05, ηp2= 0.15] and these differences did not depend on the type of program the participant enrolled in [*F* (2, 22)=3,18, *p*>0,05, ηp2= 0,22]. For *Distress total score*, there were no significant differences between the three moments [*F* (2, 22)=0.21, *p*>0.05, ηp2= 0.02], and these were not dependent on the type of program that the participant attended to [*F* (2, 22)=0.36, *p*>0,05, ηp2= 0.03] (see Figures 13 and 14). Considering the cut-off, only seven

participants (53.8%) from the total samples in M0 and M1 presented scores higher that 10, in negative affectivity and social inhibition. However, in M2, the percentage decreased to 46.2% (6 participants).

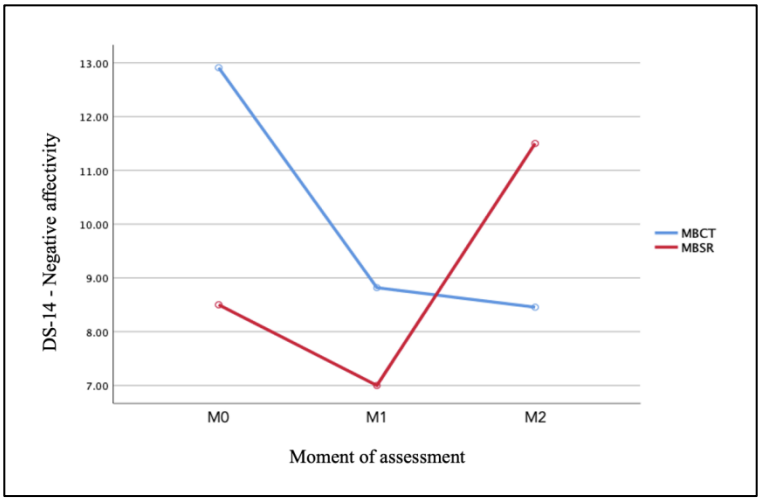

Figure 13. Results from negative affectivity (DS-14), in the three moments of assessment, in the two groups

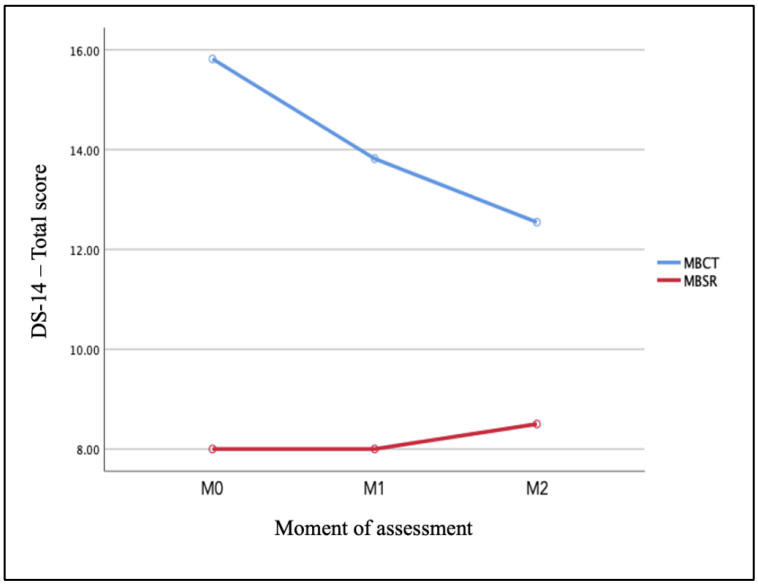

Figure 14. Results of the DS-14 total score in the three moments of assessment in the two groups

In conclusion, there were no significant differences neither in awareness, acceptance, nor in negative affectivity over time in any group.

Comparison between M0 and M1 (n = 38; MBCT program only)

Considering *Posttraumatic Growth*, all the dimensions improved significantly from baseline to post-intervention. Participants experienced better relationships with others [$t(37) = -2.32$; $p <$

.05], new possibilities [$t(37) = -2.20$; $p < .05$], more personal growth [$t(37) = -2.26$; $p < .05$], more spiritual change [$t(37) = -2.01$; $p = .05$], and more appreciation of life [$t(37) = -.99$; $p < .05$]. The PTGI total score also improved significantly [$t(37) = 2.19$; $p < .05$]. In terms of *Alexithymia*, overall participants experienced significantly less alexithymia determinants from baseline to post-intervention [$t(37) = 4.26$; $p < .001$]. Particularly, participants experienced less difficulty in identifying feelings after the intervention [$t(37) = 5.98$; $p < .001$]. Despite participants experienced less difficulties in describing their feelings and less externally oriented thinking, these change were not statistically significant [$t(37) = 1.32$; $p = .195$; $t(37) = .165$; $p = .870$, respectively]. For *Dispositional Mindfulness*, participants experienced significantly more awareness post-intervention [$t(37) = -5.23$; $p < .001$], but less acceptance [$t(37) = 4.45$; $p < .05$]. Considering *Distress,* participants experienced significantly less negative affectivity [$t(37) = 5.06$; $p <.001$] and less social inhibition [($t(37) = 2.18$; $p <.05$] after the intervention.

Means and standard errors are presented in Table 4. Overall, from M0 to M1 significant improvements were found in terms of personal growth, alexithymia, awareness, and negativity affect.

Table 4. Means and standard errors at baseline and after intervention (n = 38)

Variable	M0 (pre-intervention)	M1 (post-intervention)
PTGI-SF[a] (relating to others)	1.88 (.24)	2.60 (.27)
PTGI-SF[a] (new possibilities)	2.11 (.23)	2.80 (.28)
PTGI-SF[a] (personal growth)	2.10 (.22)	2.89 (.28)
PTGI-SF[a] (spiritual change)	1.86 (.22)	2.33 (.25)
PTGI-SF[a] (appreciation of life)	2.45 (.22)	2.74 (.29)
PTGI-SF[a] (total score)	2.08 (.19)	2.67 (.25)
TAS-20[b] (difficulty identifying feelings)	2.97 (.19)	2.19 (.14)
TAS-20[b] (difficulty describing feelings)	2.85 (.11)	2.75 (.10)
TAS-20[b] (externally orientated thinking)	3.49 (.09)	3.48 (.07)
TAS-20[b] (total score)	3.15 (.10)	2.84 (.08)
PHLMS[c] (awareness)	3.47 (.11)	3.96 (.08)
PHLMS[c] (acceptance)	3.33 (.12)	2.74 (.12)
DS-14[d] (negative affectivity)	15.39 (1.16)	10.71 (1.04)
DS-14[d] (social inhibition)	13.84 (.60)	12.32 (.77)

Note. [a]Posttraumatic Growth Inventory – short form; [b]Toronto Alexithymia Scale; [c]Philadelphia Mindfulness Scale; [d]Distress Scale.

Comparison between M0 and M2 (n = 11; MBCT program only)

Although comparisons regarding the MBCT showed differences between pre- and post-assessments, there were no mean differences between the groups [M1-M0 and M2-M0 (p>0.05)] (see Table 5). For *Posttraumatic Growth*, no statistically improvements were found from baseline

to follow-up in any dimensions of the PTGI. In terms of *Alexithymia*, participants experienced less difficulty in identifying feelings four months after the intervention [$t(11) = 2.27$; $p < .05$]. No significant improvements were found for the remaining dimensions of the TAS-20 neither for the TAS-20 total score. For *Dispositional Mindfulness*, participants experienced significantly more awareness [$t(11) = -2.26$; $p < .05$] and acceptance [$t(11) = -2.86$; $p < .05$], at follow-up. Finally, considering *Distress*, participants experienced significantly less general distress [$t(11) = 2.83$; $p < .05$] and specifically less negative affectivity [$t(11) = 2.75$; $p < .05$] four months after the end of the intervention. No significant improvements were found for social inhibition.

Overall, from time 0 to time 2 significant improvements were found in terms of difficulty in identifying feelings, awareness and acceptance, and negativity affect.

Table 5. Means and standard errors at baseline and at follow-up (n = 11)

Variable	M0 (baseline)	M2 (follow-up)
PTGI-SF[a] (relating to others)	2.86 (.32)	2.55 (.41)
PTGI-SF[a] (new possibilities)	2.73 (.33)	2.82 (.47)
PTGI-SF[a] (personal growth)	3.36 (.23)	2.95 (.50)
PTGI-SF[a] (spiritual change)	2.95 (.44)	2.73 (.56)
PTGI-SF[a] (appreciation of life)	3.14 (.28)	3.00 (.50)
PTGI-SF[a] (total score)	3.01 (.26)	2.81 (.45)
TAS-20[b] (difficulty identifying feelings)	2.31 (.33)	1.79 (.28)
TAS-20[b] (difficulty describing feelings)	2.58 (.12)	2.45 (.17)
TAS-20[b] (externally orientated thinking)	3.53 (.09)	3.57 (.03)
TAS-20[b] (total score)	2.87 (.13)	2.67 (.13)
PHLMS[c] (awareness)	3.64 (.14)	4.05 (.14)
PHLMS[c] (acceptance)	2.81 (.43)	3.47 (.67)
DS-14[d] (negative affectivity)	12.63 (2.19)	8.45 (1.36)
DS-14[d] (social inhibition)	13.27 (.1.18)	11.09 (.23)

Note. [a]Posttraumatic Growth Inventory – short form; [b]Toronto Alexithymia Scale; [c]Philadelphia Mindfulness Scale; [d]Distress Scale.

4. Discussion

Mindfulness has been constantly associated with positive physical and psychological health indicators (Siegel et al., 2009). In fact, the practice and participation in MBIs assure psychological benefits (Lomas et al., 2018; Teixeira & Pereira, 2009).

The present study aimed to comprehend if, after the participation in one of the central structured MBIs (MBCT or MBSR), the levels of alexithymia, dispositional mindfulness, distressed personality, and posttraumatic growth changed, and if these variations remained four months later. Results showed that there was a statistically significant increase in the four variables being studied after the participation in one of the programs (MBCT). This suggests

that, after the participation, participants acquire a higher capacity of differentiation and awareness of feelings and emotions, and of focusing in the present moment; as well as a lower propensity to experience negative emotions and social inhibition; so as an increase in perceived psychological growth.

However, due to the small number of participants in the MBSR at follow-up, we were not able to examine if results depend on the type of program. Our option was focus on the results from the MBCT program. The correlational results regarding alexithymia were according to the scientific literature (Marzano et al., 2019; Teixeira & Pereira, 2015). The results showed that by engaging in a MBCT program, participants acquired a higher capacity of differentiation and awareness of feelings and emotions, with a decrease in total alexithymia characteristics (from M0 to M2). These results matched Fissler et al. (2016) research, concluding that the participation in structured MBIs contribute to reduce alexithymia scores, when compared with controls. In the present study, significant improvements were also found at M2, with alexithymia traits in participants being lower than M0. This translates a clear improvement of awareness regarding feelings and sensations among participants. Viding et al. (2015) also verified the efficacy of mindfulness practices, three and six months after a program. This seems to suggest that this intervention may be useful for individuals with high levels of alexithymia (literature also shows a relationship between alexithymia and diabetes, eating disorders, or even among Forestry Officers; Craparo et al., 2020; Gangemi et al., 2021; Pintaudi et al., 2021).

The results concerning dispositional mindfulness showed that the participation in MBIs promote an increase in awareness and acceptance, translated in a higher capacity of the individual to focus in the present moment, at M1 and M2. These results confirm Bloise et al. (2016) study, that also showed improvements in awareness and acceptance after an MBI. We can extrapolate, for example, that MBIs may be particularly useful for university students since dispositional mindfulness is important for academic performance (e.g., Heshmati & Pellerone, 2018).

The results found for type D personality revealed less propensity to experience negative emotions after an MBI. The same was verified at M2 suggesting that, effectively, the participation in these programs allows maintenance of short-term benefits. The results found from M0-M1 were consistent with literature. For example, a study from Nyklíček et al. (2013) revealed that, actually, although the scores did not differ between groups (intervention vs. controls), the intervention group showed stronger reductions in social inhibition and negative affectivity after the participation in an MBSR.

There were some inconsistencies in the scores regarding posttraumatic growth, since, after the program, there was a significant increase in three of the subscales: new possibilities, personal strength, and spiritual change. However, at follow-up, these scores were not consistent. Instead, Garland et al. (2007) showed that the participation in an MBSR improved positive growth and spirituality, and reduced stress, after traumatic/adverse life experiences. The fact that most of the participants in the present study did not experience a traumatic/adverse life event in recent times, might have influenced the results, since only six participants answered the PTGI-SF scale (according to the experienced event).

5. Limitations and Future Research Directions

It is important to note some limitations that are inherent to this type of studies. First, a control group was not included. This prints a difficulty to ensure that the benefits found were related to the intervention itself or with other factors (such as, time). It would be beneficial to compare groups (intervention vs. control) in the considered variables. Another limitation that must be pointed out concerns sample size, considered small and imbalanced in terms of sex, with a high-rate attrition, namely at M2 and, in a more significant way, in MBSR. Indeed, the lack of power due to the small number of participants may have contributed to some of the null findings. However, we decided to respect the decision of each participant to answer, or not, to all moments. At last, since the participants intentionally decided to attend the MBIs, this might have influenced, tendentiously and in a positive way, the results. Despite these limitations, our aims were achieved. Present results showed that mindfulness practices and structured MBIs seem to contribute positively to good psychological functioning, namely diminishing alexithymia, increasing dispositional mindfulness, reducing the incidence of distress in personality, and increasing posttraumatic growth.

The authors recognize this study as ambitious, since most studies verifying the effectiveness of these programs only included one pre and one post-assessment. This study allows a better perception of short-term results, since it includes a four months follow-up. In future studies, it would be interesting to conduct more follow-ups, in order to verify the possibility of higher effectiveness of the programs. Future studies should also examine the effectiveness of mindfulness in more heterogenous sample (e.g., men vs women; clinical vs non-clinical sample; young vs older participants) to explore moderators of the interventions and know who may benefit more from MBIs. Also, it would also be interesting to perform similar studies assessing other variables such as anxiety, stress, and depression, since they are very prevalent disorders in our society, and explore mediators to better understand why this type of intervention is effective.

6. Clinical implications

The present study enabled to understand the benefits associated with structured mindfulness programs (namely MBCT and MBSR). For clinical practice, the results showed that the consideration of MBIs, as a complement to psychotherapy, or as an isolated tool, implies an added value, helping each participant to regulate their psychological functioning and promote well-being, since mindfulness acts not with the purpose of changing thoughts but with the intention of promoting acceptance. This way, patients will be able to recognize the feelings and dysfunctional thoughts that cause suffering and, thus, find strategies to manage them, allowing more functional answers to diverse problems.

Authors' contribution:

RJT, MVM and RP designed the study and collected the data. RJT and TB analyzed and interpreted the data. RJT, MVM and TB composed the original manuscript. All authors contributed to the final manuscript.

Institutional Review Board Statement: All participants gave their informed consent for inclusion before they participated in the study. All data was obtained in an anonymized form and data are not externally accessible. The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the University of Aveiro Ethics Committee.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Conflicts of Interest: The authors declare no conflict of interest.

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