



A 7-year follow-up study of the Mindfulness-Based Program for Infertility: Are there long-term effects?

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The Mindfulness-Based Program for Infertility (MBPI) was developed for people facing infertility and proved effective in cultivating mindfulness skills, improving infertility self-efficacy, and decreasing depression, shame, entrapment, and defeat feelings. Fifty-five women attended the MBPI sessions and completed self-report measures of depression, anxiety, mindfulness, and experiential avoidance at post-MBPI (T1), 6-month follow-up (T2), and 7-year follow-up (T3). There were significant direct time effects regarding experiential avoidance ($F = 3.81$; $p < 0.033$; $\eta_p^2 = 0.08$), the mindfulness facets describing ($F = 3.54$; $p = 0.037$; $\eta_p^2 = 0.13$), acting with awareness ($F = 6.87$; $p = 0.002$; $\eta_p^2 = 0.22$), nonjudging of inner experience ($F = 10.66$; $p < 0.001$; $\eta_p^2 = 0.31$), and depressive symptoms ($F = 4.85$; $p = 0.020$; $\eta_p^2 = 0.10$). There was an increase in the describing facet from T1 to T3 ($p = 0.036$). The act with awareness facet increased from T1 to T2 ($p = 0.010$) and from T1 to T3 ($p = 0.007$), as well as the nonjudging of inner experience facet (T1 to T2 [$p = 0.030$] and T1 to T3 [$p = 0.002$]). Experiential avoidance decreased from T1 to T3 ($p = 0.022$) and depressive symptoms from T1 to T2 ($p = 0.019$). Post-MBPI scores were maintained at T2 and T3 concerning anxiety symptoms and the observing and no-reactivity mindfulness facets. There were long-term effects of MBPI on mindfulness and experiential avoidance. Moreover, therapeutic gains were maintained regarding depression and anxiety symptoms, independently of the reproductive outcome.

KEYWORDS

anxiety symptoms, depressive symptoms, emotion regulation, follow-up study, infertility, mindfulness

1 | INTRODUCTION

The International Glossary on Infertility and Fertility Care defines infertility as “A disease characterized by the failure to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse or due to an impairment of a person's capacity to reproduce either as an individual or with his/her partner” (Zegers-Hochschild et al., 2017, p. 401). In addition to this medical definition, infertility can also be conceptualized as a social condition where couples or individuals may not be able to achieve parental or reproductive roles in society (Allan & Mounce, 2015). Estimates on the prevalence of

infertility state that approximately 9% of worldwide couples of reproductive age face fertility issues (Boivin, Bunting, Collins, & Nygren, 2007).

Growing knowledge about the psychological implications of infertility indicated that the medical and psychological components cannot be separated, both in terms of diagnosis and treatment (De Berardis et al., 2014). Infertility has been described as a stressful life event, threatening the realization of an important and valued life goal (Almeida-Santos & Moura-Ramos, 2010; Covington & Adamson, 2015). Furthermore, for couples seeking assisted reproductive technologies (ART), there are numerous additional difficulties (e.g., daily

self-injections, medical examinations, oocyte retrieval, and embryo transfer), predominantly for the female partner trying to become pregnant. In fact, the improvement and widespread availability of medical treatment options have also led to a focus on the psychological aspects of infertility and the development of different therapeutic approaches for people dealing with fertility problems.

A previous meta-analysis addressing results of psychological interventions targeting patients diagnosed with infertility stated that these approaches, particularly group interventions focusing on education and skills training, were effective in reducing negative affect (anxiety, tension, and worry) but no effects were found for pregnancy rates (Boivin, 2003). de Liz and Strauss (2005) also found positive results deriving from group/individual psychotherapy in reducing anxiety and depression symptoms in patients presenting with infertility. In contrast, Hammerli, Znoj, and Barth (2009) reported, in another meta-analysis, a positive impact on pregnancy rates, although no significant effects of psychological interventions concerning mental health (anxiety and depression) were found. More recently, a meta-analysis including 39 studies (Frederiksen, Farver-Vestergaard, Skovgård, Ingerslev, & Zachariae, 2015) suggested that psychosocial interventions are helpful for reducing distress and for improving ART pregnancy outcomes.

Mindfulness-based approaches have been developed and proved effective in a wide range of health problems (e.g., chronic pain, cancer, endometriosis, anxiety disorders, and depression) and settings (e.g., primary care, specialized health units, schools, and organizations; e.g., Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Khoury et al., 2013). In the context of mindfulness-based approaches, and specifically targeting women with an infertility diagnosis, several programmes have been developed. A Mindfulness-Based Cognitive Therapy (MBCT) pilot group programme, developed by Sherratt and Lunn (2013), comprised eight weekly sessions of 2 hr each. The MBCT programme included teaching mindfulness practices (e.g., body scan, mindful movement, and sitting meditation) and the use of these practices to deal with pain, negative emotions, and unpleasant sensations. Although this was a pilot study, including nine women and no control group, results showed that mean scores on well-being and problems subscales of the Clinical Outcomes in Routine Evaluation Questionnaire, as well as on the World Health Organization Well-Being Questionnaire, changed from the clinical range to the non-clinical range (Sherratt & Lunn, 2013). More recently, another mindfulness-based programme for women undergoing a first in vitro fertilization (IVF) treatment was developed and tested by Li, Long, Liu, He, and Li (2016). The Mindfulness-Based Intervention for IVF women (MBII) was tailored based on a revision of the Mindfulness-Based Program for Stress Reduction (MBSR; Kabat-Zinn, 1990), MBCT (Segal, Williams, & Teasdale, 2002), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and Mindfulness-Based Childbirth and Parenting (Bardacke, 2012). The MBII encompasses six weekly, 2- to 2.5-hr sessions and aims to promote mindfulness skills mainly through the teaching of (a) mindfulness of thoughts and feelings, (b) mindfulness of the body (body scan, body awareness, and hatha yoga), (c) discussion of mindfulness attitudes (e.g.,

Key Practitioner Message

- This is a 7-year follow-up study of the Mindfulness-Based Program for Infertility.
- Effects were found regarding emotion regulation mechanisms and psychopathological symptoms.
- Mindfulness-Based Program for Infertility effects seem independent from reproductive outcomes.
- Future studies should consider active control groups and a randomized controlled trial format.

acceptance, letting go, and patience), and (d) encouragement for applying mindfulness practices into daily life, particularly in situations related to the IVF treatment. The MBII was applied in a sample of 58 women, and 50 women were assigned to a routine care control group. Time \times Group interaction effects were found for self-compassion, emotion regulation difficulties, mindfulness, and mind-body and total FertiQol (medium effect sizes). Women in the experimental group showed an increase in self-compassion, mindfulness, and quality of life and a decrease in emotion regulation difficulties when compared with women in the control group (Li et al., 2016). Moreover, women who attended the MBII also showed higher pregnancy rates compared with the ones in the control group. The Mindfulness-Based Program for Infertility (MBPI), addressed in this study, was developed based on the MBSR (Kabat-Zinn, 1990), the Mind Body Program for Infertility (Domar, Seibel, & Benson, 1990), and basic principles of ACT (Hayes et al., 1999). This programme is intended to cultivate mindfulness and acceptance skills, as well as values (chosen life directions) clarification, leading to valued actions and to a vital life. The cultivation of awareness through mindfulness practice might be a way of being in touch in an open and nonjudgmental way, moment by moment, with painful inner mental states (e.g., feelings, thoughts, and memories, associated or not with infertility). Additionally, attitudes of kindness, curiosity, and willingness to be present with the unfolding experience are stimulated, as well as the ability to recognize one's experiences as part of the larger human experience (common humanity). In fact, the MBPI sessions encompass exercises involving what Atkinson (2013) defines as focused attention meditation (intention to keep one's focus on the breath or bodily sensations); open monitoring meditation (monitoring moment-to-moment experience with a receptive and nonjudgmental attitude); and the cultivation of compassion for self and others. Furthermore, it comprises a psychoeducation component addressing topics such as infertility-related stress, lifestyle factors affecting fertility, and the importance of self-care (being good to oneself) in order to promote knowledge and normalize experiences related to the infertility condition. Seven of the 10 sessions follow a similar structure: (a) a first half hour of sharing (optional); (b) a formal mindfulness practice and sharing of this experience; (c) experiential exercises/group discussions; and (d) a 3-min breathing space exercise. The MBPI is delivered in a group

format (10 to 15 participants) and includes 10 weekly sessions (nine sessions of 2 hr each and one session that lasts for 1 day). Partners are invited to take part in the three sessions that follow a different structure (Sessions 1, 6, and 8). Session 1 is essentially introductory –participants and therapist introduce themselves; the MBPI goals, contents, and structure are presented. Session 6 lasts for 1 day and includes hatha yoga practice; watching the video *The Joy of Stress* by Loretta LaRoche; the exercise “map of life” that highlights values as chosen life directions and addresses committed action towards a valued and meaningful life; a couple's communication exercise of sharing feelings related to their marital relationship; and a mindfulness practice “listening to classical music.” In Session 8, participants are able to get in touch with different possibilities regarding parenthood due to testimonials of invited guests (a couple who pursued adoption, a couple with a child conceived through third-party reproductive techniques, and a couple who has chosen to remain childless). Throughout the sessions, besides mindfulness practices, several metaphors and experiential exercises, derived from ACT, are used to support the embracing of more flexible attitudes towards private events, promoting their observation, decentring (observe one's thoughts and feelings in a detached way, as impermanent events in the mind [Fresco et al., 2007]), and nonreacting. A Therapist Manual (Galhardo, 2012) describing each session details and a Participants Manual comprising a set of handouts related to each session topics are available. Moreover, audio files with mindfulness instructions are also provided in order to promote practice between sessions. The MBPI showed to be effective in decreasing depressive symptoms, internal and external shame, entrapment, and defeat (Galhardo, Cunha, & Pinto-Gouveia, 2013). External shame can be defined as the belief that one exists negatively in the mind of others, as inferior, inadequate, or flawed, and internal shame corresponds to a feeling associated with negative personal judgments of one's features, feelings, and fantasies (Gilbert, 1998; Gilbert & Irons, 2005). Moreover, entrapment is related to the desire to escape from a situation perceiving all possibilities to overcome that situation as being impeded (Gilbert & Allan, 1998). Finally, defeat may arise when individuals are strongly determined to accomplish biosocial goals (e.g., achieving parenthood) but fail and identify themselves to be defeated (Gilbert & Allan, 1998). Results also showed that MBPI participants presented a significant improvement in mindfulness skills and in the perception of self-efficacy to deal with infertility when compared with a waitlist control group. Furthermore, significant decreases in anxiety symptoms, experiential avoidance/psychological inflexibility (unwillingness to remain in touch with aversive private experiences, including bodily sensations, emotions, thoughts, memories, and behavioural predispositions; Hayes & Smith, 2005), and self-judgment were also found when comparing baseline and post-MBPI scores within the group that completed the programme (Galhardo et al., 2013).

As mentioned earlier, there are several mindfulness-based interventions for women facing fertility problems; nevertheless, to our knowledge, no data were available regarding follow-up studies of such programmes. In this context, the current study aimed to examine whether the effects of attending the MBPI were sustained for a long

period of time after the intervention. Three assessment moments were considered: post-MBPI (T1), 6-month follow-up (T2), and 7-year follow-up (T3). These effects were addressed regarding psychopathological symptoms (depression and anxiety) and emotion regulation processes (mindfulness skills and experiential avoidance).

2 | MATERIALS AND METHODS

2.1 | Participants

In the first study (Galhardo et al., 2013), 55 participants completed the MBPI, and 37 were assigned to a control group (women who were interested in completing the MBPI but were unable to attend the sessions due to geographical reasons) although this was not a randomized controlled trial (RCT). Inclusion criteria were age (18 years or older) and an infertility diagnosis medically established. Participants were all married or living with a partner in a heterosexual relationship (as per requirements of the Portuguese law for the access to ART at time of recruitment). Concerning the 7-year follow-up assessment, 46 from the 55 women who completed the MBPI answered the invitation to participate (84% response rate). This invitation was sent by email, and the remaining nine email addresses revealed not to be updated and were returned to sender. In the current study, only women who completed the MBPI were examined. All women were White and identified themselves as heterosexual.

2.2 | Instruments

A sociodemographic and clinical form was used to collect sociodemographic data (age, marital status, and years of education) and clinical data (infertility duration, previous treatments, and current treatment). At T3, this form also included questions regarding offspring and for those with children whether the pregnancy occurred following ART, was spontaneous or if participants had pursued adoption. This questionnaire also addressed the subjective degree of positive impact that the MBPI had in participants' lives, and continuity and nature of mindfulness practice in the 7-year period after MBPI completion. Moreover, participants were asked whether they attended some kind of psychological intervention (e.g., individual or group psychotherapy and mindfulness training) during the 7-year period.

Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), Portuguese version by Vaz-Serra and Abreu (1973), is an extensively used self-rated scale assessing depressive symptoms (e.g., mood, pessimism, sense of failure, guilt, self-dislike, self-accusation, suicidal ideas, crying, irritability, social withdrawal, work difficulty, insomnia, fatigability, loss of appetite, and loss of libido). BDI is a widely accepted instrument for assessing depression in clinical samples and detecting depression in general populations. Higher scores express higher levels of depressive symptoms. In the current study, the BDI Cronbach α was 0.85.

The State-Trait Anxiety Inventory-Y1 (Spielberg, 1973), Portuguese version by Daniel (1996), is a 40-item self-report instrument of trait

and state anxiety. In the current study, we used the state anxiety subscale (20 items). State anxiety items include "I am tense" and "I am worried," and respondents are asked to rate on a 4-point scale how they are feeling at the moment. Higher scores reveal more state anxiety. In this study, the State-Trait Anxiety Inventory Cronbach α coefficient was 0.94.

Acceptance and Action Questionnaire II (Bond et al., 2011), Portuguese version by Pinto-Gouveia, Gregório, Dinis, and Xavier (2012), is a seven-item self-report measure developed to assess experiential avoidance. This construct has been defined as the unwillingness to remain in contact with private experiences, such as thoughts, feelings, and bodily sensations, and attempt to modify the form or frequency of these experiences or the contexts that give origin to them (e.g., "My painful memories prevent me from having a fulfilling life"). Higher scores indicate higher levels of experiential avoidance. In this study, a Cronbach α of 0.89 was reported.

Five Facet Mindfulness Questionnaire (Baer et al., 2008), Portuguese version by Gregório and Pinto-Gouveia (2011), is a 39-item self-report instrument that assesses different mindfulness skills. The Five Facet Mindfulness Questionnaire encompasses five subscales: observing (e.g., "I pay attention to how my emotions affect my thoughts and behaviour"), describing (e.g., "I can easily put my beliefs, opinions, and expectations into words"), acting with awareness (e.g., "When I do things, my mind wanders off and I'm easily distracted"), nonjudging of inner experience (e.g., "I tell myself I shouldn't be feeling the way I'm feeling"), and nonreactivity to inner experience (e.g., "I perceive my feelings and emotions without having to react to them"). Higher scores indicate higher levels of mindfulness components. Cronbach coefficients in the current sample were as follows: 0.84 for the observing subscale, 0.82 for the describing subscale, 0.90 for the acting with awareness subscale, 0.91 for the nonjudging of inner experience, and 0.71 for the nonreactivity to inner experience.

2.3 | Procedures

The study was approved by the Scientific Committee of the Faculty of Psychology and Educational Sciences of the University of Coimbra. It was also approved by the Portuguese Foundation for Science and Technology (including the 6-month follow-up, but not the 7-year follow-up). The Portuguese Fertility Association (patients' association) board approved the study and collaborated in its dissemination. All procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

The aims of the study, inclusion criteria, participants' role, researchers' obligations, and procedure to participate were described in a recruitment announcement posted at the Portuguese Fertility Association website. All participants gave their written informed consent and completed a set of self-report instruments for the assessment of depressive symptoms, anxiety symptoms, experiential avoidance, and mindfulness competencies at the three time points

considered. At post-MBPI and at 6-month follow-up, paper-pencil versions were filled in. Concerning the 7-year assessment, participants were contacted by email and completed the same self-report measures online.

2.4 | Data analyses

All quantitative data were analysed using IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp. Descriptive statistics were used to characterize participants' demographic and clinical characteristics as well as the continuity of mindfulness practice during the 7-year period of time. To explore whether the results were maintained, mean differences between post-treatment (T1), 6-month follow-up (T2), and 7-year follow-up (T3) repeated measures ANOVAs were conducted. There was no severe violation of normal distribution ($|Sk| < 3$ and $|Ku| < 8-10$; Kline, 2005). Whenever the sphericity assumption was not verified, the Greenhouse-Geisser epsilon ($\epsilon < 0.75$) was used (Field, 2009). Effect sizes were calculated through partial η^2 (η_p^2 ; Marôco, 2010). Independent samples *T* tests were calculated to compare means at T3 between women who continued mindfulness meditation practice and women who did not continue this formal practice as well as between women who became mothers and those who remained childless. Pearson correlations were also conducted to explore associations between mindfulness facets and experiential avoidance changes (T3-T1) and depressive and anxiety symptoms changes (T3-T1). A confidence interval of 95% was used in all the analyses.

3 | RESULTS

Concerning demographic characteristics, results showed that at T3 (7-year follow-up), participants presented a mean age of 42.50 ± 4.18 years old and a mean of years of education of 16.17 ± 2.38 . The majority of participants were married or living with a male partner (89.1%; $n = 41$), and 10.9% ($n = 5$) women were divorced. Thirty-six women had at least one child (78.3%), and 21.7% ($n = 10$) remained childless 7 years after completing the MBPI. From the 36 women who achieved motherhood, 61.11% ($n = 22$) gave birth following ART, 19.44% ($n = 7$) had a spontaneous pregnancy, and 19.44% ($n = 7$) became mothers through adoption. A second child resulting from spontaneous pregnancy was also reported by six of the 22 women who already had children following ART.

When asked the degree of positive impact of the MBPI in their lives, 34.8% participants ($n = 16$) stated that it had a moderate impact, 32.6% ($n = 15$) stated that it had a high impact, 28.3% ($n = 13$) stated that it had a very high impact, and only 4.3% ($n = 2$) answered that it had little impact. Regarding the continuity of formal mindfulness practice (meditation) after the programme, 26.1% ($n = 12$) participants mentioned that they continued to practice, and 73.9% ($n = 34$) stated that they did not continue the formal practice. Moreover, when considering informal mindfulness practice (brief mindfulness exercises such as the 3-min breathing space or paying attention to the present

moment experience), 78.3% ($n = 36$) women continued to perform this kind of exercises and 21.7% ($n = 10$) did not. During the 7-year period, 6.5% participants ($n = 3$) reported having attended individual psychotherapy.

Repeated measures ANOVAs results considering T1, T2, and T3 are presented in Table 1.

No significant differences were found for anxiety symptoms and mindfulness facets of observing and nonreactivity to inner experience, suggesting that results are sustained at 6 months and 7 years after the programme conclusion. Regarding depressive symptoms, significant differences were found. Pairwise comparisons showed a significant decrease from T1 to T2 ($p = 0.019$) and no significant differences between T1 and T3 scores ($p = 0.148$). Experiential avoidance showed a gradual decrease over time with a significant difference between T1 and T3 ($p = 0.022$). Concerning the mindfulness facets, there was a gradual increase in the describing facet from T1 to T3 ($p = 0.036$). The act with awareness facet revealed a significant increase from T1 to T2 ($p = 0.010$) and from T1 to T3 ($p = 0.007$). A similar pattern was found for the nonjudging of inner experience facet, with a significant increase from T1 to T2 ($p = 0.030$) and from T1 to T3 ($p = 0.002$). No significant differences were found from T2 to T3 in the act with awareness mindfulness facet ($p = 0.527$) and in the nonjudging of inner experience facet ($p = 0.125$).

Additionally, and considering the data at the 7-year follow-up (T3), differences between women who continued the formal mindfulness practice (meditation) and the ones who did not continue the meditation practice (although they continued the informal practice) were explored through independent samples T tests, and no differences were found regarding depressive symptoms, anxiety symptoms, mindfulness facets, and experiential avoidance ($p > 0.050$). Comparisons in T3 scores of the study variables between women who had children and those who remained childless were also estimated through independent samples T tests. Results showed no significant differences

($p > 0.050$), except for experiential avoidance ($t = -2.47$; $p = 0.023$). Women who achieved motherhood revealed lower experiential avoidance scores ($M = 15.24$; $SD = 6.23$) when compared with those without children ($M = 20.60$; $SD = 5.76$).

Moreover, correlations between the change in the mindfulness facets and experiential avoidance (T3–T1) and changes in depressive symptoms and anxiety symptoms (T3–T1) were explored. Results showed significant correlations between changes in depressive symptoms and changes in the nonjudging of inner experience facet ($r = -0.46$; $p = 0.020$), as well as changes in depressive symptoms and changes in experiential avoidance ($r = 0.38$; $p = 0.010$). Regarding changes in anxiety symptoms, significant correlations were found with changes in experiential avoidance ($r = 0.54$; $p < 0.001$).

4 | DISCUSSION

To our knowledge, the current study is the first to suggest lasting effects of a mindfulness-based intervention specifically targeting women facing infertility. Considering the analysis of outcomes preintervention–postintervention, MBPI results proved superior to the waitlist control group results concerning the increase of mindfulness skills and the perception of self-efficacy to face the infertility diagnosis and demands of infertility medical treatment and simultaneously decrease depressive symptoms and feelings of shame and entrapment (Galhardo et al., 2013). Additionally, in women who attended the MBPI, a significant decrease in anxiety and experiential avoidance was also found (Galhardo et al., 2013). These were promising results, but whether these benefits persisted over time remained undetermined. In this context, the present study was designed and conducted.

The current study revealed some interesting patterns of outcomes. A steady maintenance of effects was found for anxiety symptoms. These findings may suggest that these women may have developed

TABLE 1 Repeated measures ANOVAs results comparing post-Mindfulness-Based Program for Infertility (T1), 6-month follow-up (T2), and 7-year follow-up (T3) means, effect size, and observed power

Measure	T1		T2		T3		$F(2, 43)$	p	η_p^2	Observed power
	M	SD	M	SD	M	SD				
BDI	6.15	4.09	4.80	4.69	7.67	7.35	4.85	0.020	0.10	0.682
STAI-Y1	43.28	8.72	40.41	10.74	40.24	11.89	1.79	0.173	0.04	0.366
AAQ-II	19.26	7.09	18.28	6.75	16.54	6.44	3.81	0.033	0.08	0.630
FFMQ_Observe	27.76	6.87	26.52	5.80	26.24	6.72	1.21	0.300	0.05	0.218
FFMQ_Describe	25.96	5.02	28.12	6.33	29.12	4.97	3.54	0.037	0.13	0.632
FFMQ_Actaware	22.80	6.88	28.20	5.17	29.08	6.08	6.87	0.002	0.22	0.906
FFMQ_Nonjudge	21.40	6.44	26.84	5.98	29.92	7.66	10.66	<0.001	0.31	0.985
FFMQ_nonreact	21.80	3.35	20.40	3.22	21.28	3.94	1.30	0.282	0.05	0.268

Note. Effect sizes were calculated through partial η^2 (η_p^2). A $\eta_p^2 \leq 0.05$ corresponds to a small effect, $\eta_p^2 [0.05; 0.25]$ to a medium effect, $\eta_p^2 [0.25; 0.50]$ to a large effect, and $\eta_p^2 > 0.50$ to a very large effect. BDI: Beck Depression Inventory; STAI-Y1: Spielberger State-Trait Anxiety Inventory—State; AAQ-II: Acceptance and Action Questionnaire-II; FFMQ_Observe: Five Facet Mindfulness Questionnaire observing facet; FFMQ_Describe: Five Facet Mindfulness Questionnaire describing facet; FFMQ_Actaware: Five Facet Mindfulness Questionnaire acting with awareness facet; FFMQ_Nonjudge: Five Facet Mindfulness Questionnaire nonjudging of inner experience facet; FFMQ_nonreact: Five Facet Mindfulness Questionnaire observing facet nonreactivity to inner experience facet. The bold p is to easily identify the significant differences.

a new way to deal with stressful situations in their lives leading to the experience of lower anxiety levels. Changes in anxiety symptoms seem to be related to changes in experiential avoidance. This association means that being more willing to contact aversive private experiences (e.g., threatening thoughts, feelings, and body sensations) may contribute to lower anxiety symptoms. Obviously, it can also be acknowledged that women who reduced their anxiety levels may be less prone to use experiential avoidance as a mechanism to deal with negative experiences. Nevertheless, the relationship between experiential avoidance and anxiety symptoms had already been pointed to in previous meta-analytic reviews in which mindfulness-based therapy was found to be effective for moderately decreasing anxiety symptoms in the overall sample (Hofmann, Sawyer, Witt, & Oh, 2010; Vøllestad, Nielsen, & Nielsen, 2012). Furthermore, robust effect sizes were maintained over follow-up in patients with anxiety and mood disorders (Hofmann et al., 2010). Considering depressive symptoms, it is worth noting not only was there a decrease at the 6-month follow-up but the scores were maintained at the 7-year follow-up. Changes in depressive symptoms showed to be associated with changes in the nonjudging of inner experience mindfulness facet as well as with changes in experiential avoidance. This relationship points to the possibility that dealing with inner experience in a less judgmental way and being more open and receptive towards painful private experiences may lower depressive symptomatology throughout time. In fact, self-criticism can be seen as a trans-diagnostic construct showing a significant prospective relationship with symptoms of psychopathology, particularly with depression (McIntyre, Smith, & Rimes, 2018). Our results are consistent with the ones found in an overview of systematic reviews and meta-analyses of RCTs of mindfulness-based interventions in health care that found evidence supporting the use of MBSR and MBCT to decrease depressive and anxiety symptoms in cancer, cardiovascular disease, chronic pain, depression, and anxiety disorders (Strauss, Cavanagh, Oliver, & Pettman, 2014).

Mindfulness skills and experiential avoidance can be seen as emotion regulation processes with impact in psychopathological symptoms. In fact, continuing improvements in mindfulness skills, particularly in the nonjudging of inner experience facet during the period after the end of the MBPI, could, to some extent, may be facilitated by the mindfulness practice (formal and informal) that is conducted and stimulated between sessions. Participants learned to observe and describe one's experiences without judgment and without reacting to the inner experience. Moreover, they developed an attitude of acceptance towards the unfolding experience (whether it is pleasant or unpleasant, wanted or unwanted) and were able to live their lives in a valuable way, despite achieving or not motherhood. It is worth noting that approximately one third of these women kept their formal mindfulness practice regular and even those who mentioned that they discontinued the mindfulness meditation practice, all except one referred that they continued to do the informal practice. The importance of informal mindfulness practice has been suggested in a previous study that found that these kind of exercises were related to continued beneficial outcomes for quality of life and worry in patients with generalized anxiety disorder (Morgan, Graham, Hayes-

Skelton, Orsillo, & Roemer, 2014). One may hypothesize that, by means of specific short meditation exercises (e.g., 3-min breathing space), these women learned to focus and sustain attention and increased their awareness to the present moment experience. Consequently, habitual and negative automatic reactions to emotions and thoughts can thus be prevented. Instead, more balanced responses (as opposed to automatic reactions) may emerge, leading to better psychological adjustment.

Experiential avoidance has been hypothesized as an important aspect in the onset, maintenance, and modification of anxiety and depression (Chawla & Ostafin, 2007; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). This emotion regulation process comprises two related components: unwillingness to remain in touch with aversive private experiences (including bodily sensations, emotions, thoughts, memories, and behavioural predispositions) and action to change aversive experiences or the events that trigger them (Hayes & Smith, 2005). Furthermore, previous research using a naturalistic approach of experiential avoidance found that it is a context-specific regulatory strategy (Machell, Goodman, & Kashdan, 2015). The experience of an infertility diagnosis and the difficulties of medical treatment may lead to intensification of negative self-referential thoughts and depressive or anxiety feelings. This may, in turn, contribute to the avoidance of these thoughts/feelings through trying to suppress them or through the avoidance of situations such as family or friends meetings where there will be children. In the current study, participants revealed a gradual decrease of this emotion regulation mechanism, which means that there was a perspective-shifting way of relating to their experiences. It can be postulated that they improved their ability to accept the present moment experience as it is, instead of avoiding difficult or painful events. Besides, acting in a way that is congruent with personal values, in the direction of the life one wants, is also a core aspect deriving from lower levels of experiential avoidance (Chawla & Ostafin, 2007). This is in line with findings from previous studies that showed that experiential avoidance is reduced from pretreatment to post-treatment over the course of mindfulness- and acceptance-based treatments (Ciarrochi, Bilich, & Godsel, 2010; Roemer, Orsillo, & Salters-Pedneault, 2008). More recently, it was also found that greater changes in experiential avoidance across treatment significantly predicted change in worry and quality of life in patients with generalized anxiety disorder (Eustis, Hayes-Skelton, Roemer, & Orsillo, 2016). In the present study, comparison at 7-year follow-up between participants who achieved motherhood and those who remained childless showed that women who became mothers presented lower levels of experiential avoidance. It might be that the exposure to a wide range of new situations derived from the motherhood experience, associated with the ability to take perspective, can contribute to the lowering of the unwillingness to be in touch with private events (thoughts, feelings, and bodily sensations) and the efforts to escape them.

There are, however, several limitations that should be taken into account in interpreting these findings. The previous study comparing pre- to post-MBPI was not a RCT, and in the future, a RCT should be conducted in order to replicate or even expand these findings, considering, however, that double-blind placebo-controlled trials are not

possible for mindfulness interventions (Davidson & Kaszniak, 2015). Furthermore, time comparisons were only considered for participants who completed the MBPI. Control group participants enrolled in the first study (Galhardo et al., 2013) presented a dropout rate of 50% at T2 and thus were not included at T3. Another limitation is related to the use of self-report measures, particularly the ones of mindfulness and depressive symptoms. According to Baer (2016), the relevance of developing more objective performance-based methods for the assessment of mindfulness and refining self-report methods is well established. As stated by Moore, Depp, Wetherell, and Lenze (2016), ecological momentary assessment of depression and mindfulness extensively outperformed paper-and-pencil measures with the same items (sensitivity to change in anxiety symptoms was comparable across administration modes). Furthermore, the Acceptance and Action Questionnaire II may not be the best instrument for the assessment of experiential avoidance because it may confound experiential avoidance and neuroticism (general tendency to experience negative thoughts and emotions) and negative affect (Rochefort, Baldwin, & Chmielewski, 2018). Moreover, we had no data on the quantity of home mindfulness practice after the intervention.

Besides methodological limitations, there are also other variables that may have contributed to these results and that were not controlled for. For example, time-related effects (getting older), relevant life events, and pursuing other forms of psychological support may have influenced the results. However, the number of participants who had experienced a divorce or reported that they pursued some kind of psychological intervention during the 7-year period was residual.

In conclusion, and despite the aforementioned limitations, findings are consistent with the ones of other mindfulness- and acceptance-based interventions follow-up studies for medical conditions such as headache pain, endometriosis, recurrent depression, and diabetes (Day & Thorn, 2017; Hansen, Kesmodel, Kold, & Forman, 2017; Meadows et al., 2014; van Son et al., 2014). Furthermore, it is also worth noting the low attrition rate in the group who completed the MBPI over the course of the 7-year period, bearing in mind that this is a quite long period and that the main aim of the study was to explore whether the MBPI results were maintained over time. This is the first study to report long-term outcomes associated with MBPI for women with an infertility diagnosis. Overall, the results support the durability of MBPI-related benefits regarding not only emotion regulation processes but also psychopathological symptoms. This seems to happen independently from the reproductive outcome of having a child or remain childless, which suggests that the MBPI may play a role in the enhancement of psychological adjustment. Additionally, a stronger focus on group interventions, such as the MBPI, in the context of reproductive medicine could help to save limited resources and might be implemented in the routine care of patients facing fertility problems, having the advantage of long-term benefits.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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REFERENCES

- Allan, H., & Mounce, G. (2015). Managing infertility in primary care. *Practice Nursing*, 26, 440–443.
- Almeida-Santos, T., & Moura-Ramos, M. (2010). *Esterilidade e procriação medicamente assistida*. Coimbra: Imprensa da Universidade de Coimbra.
- Atkinson, B. J. (2013). Mindfulness training and the cultivation of secure, satisfying couple relationships. *Couple and Family Psychology: Research and Practice*, 2, 73–94. <https://doi.org/10.1037/cfp0000002>
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125–143.
- Baer, R. A. (2016). Assessment of mindfulness and closely related constructs: Introduction to the special issue. *Psychol Assess*, 28, 787–790. <https://doi.org/10.1037/pas0000309>
- Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., et al. (2008). Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment*, 15, 329–342. <https://doi.org/10.1177/1073191107313003>
- Bardacke, N. (2012). *Mindful birthing: Training the mind, body, and heart for childbirth and beyond*. New York: Harper Collins.
- Beck, A., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561–571.
- Boivin, J. (2003). A review of psychosocial interventions in infertility. *Social Science & Medicine*, 57, 2325–2341.
- Boivin, J., Bunting, L., Collins, J. A., & Nygren, K. G. (2007). International estimates of infertility prevalence and treatment-seeking: Potential need and demand for infertility medical care. *Human Reproduction*, 22, 1506–1512. <https://doi.org/10.1093/humrep/dem046>
- Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., ... Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy*, 42, 676–688. <https://doi.org/10.1016/j.beth.2011.03.007>
- Chawla, N., & Ostafin, B. (2007). Experiential avoidance as a functional dimensional approach to psychopathology: An empirical review. *Journal of Clinical Psychology*, 63, 871–890. <https://doi.org/10.1002/jclp.20400>
- Ciarrochi, J., Bilich, L., & Godsel, C. P. (2010). Psychological flexibility as a mechanism of change in Acceptance and Commitment Therapy. In R. Baer (Ed.), *Assessing mindfulness and acceptance: Illuminating the*

- processes of change* (pp. 51–76). Oakland, CA: New Harbinger Publications, Inc.
- Covington, S. N., & Adamson, G. D. (2015). Collaborative reproductive healthcare model. In S. N. Covington (Ed.), *Fertility counseling: Clinical guide and case studies* (pp. 1–32). Cambridge: Cambridge University Press.
- Daniel, F. (1996). *Teoria e prática psicométrica—contribuição para a validação do STAI-Y de Spielberger em estudantes do ensino superior*. Badajoz, Spain: Universitá de Extremadura.
- Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *American Psychologist*, 70, 581–592. <https://doi.org/10.1037/a0039512>
- Day, M. A., & Thorn, B. E. (2017). Mindfulness-Based Cognitive Therapy for headache pain: An evaluation of the long-term maintenance of effects. *Complementary Therapies in Medicine*, 33, 94–98. <https://doi.org/10.1016/j.ctim.2017.06.009>
- De Berardis, D., Mazza, M., Marini, S., Del Nibletto, L., Serroni, N., Pino, M. C., ... Di Giannantonio, M. (2014). Psychopathology, emotional aspects and psychological counselling in infertility: A review. *Clinica Terapeutica*, 165, 163–169. <https://doi.org/10.7417/CT.2014.1716>
- de Liz, T. M., & Strauss, B. (2005). Differential efficacy of group and individual/couple psychotherapy with infertile patients. *Human Reproduction*, 20, 1324–1332. <https://doi.org/10.1093/humrep/deh743>
- Domar, A. D., Seibel, M. M., & Benson, H. (1990). The mind/body program for infertility: A new behavioral treatment approach for women with infertility. *Fertility and Sterility*, 53, 246–249.
- Eustis, E. H., Hayes-Skelton, S. A., Roemer, L., & Orsillo, S. M. (2016). Reductions in experiential avoidance as a mediator of change in symptom outcome and quality of life in acceptance-based behavior therapy and applied relaxation for generalized anxiety disorder. *Behaviour Research and Therapy*, 87, 188–195. <https://doi.org/10.1016/j.brat.2016.09.012>
- Field, A. P. (2009). *Discovering statistics using SPSS: (and sex, drugs and rock 'n' roll)* (3rd ed.). Los Angeles: SAGE Publications.
- Frederiksen, Y., Farver-Vestergaard, I., Skovgård, N. G., Ingerslev, H. J., & Zachariae, R. (2015). Efficacy of psychosocial interventions for psychological and pregnancy outcomes in infertile women and men: A systematic review and meta-analysis. *BMJ Open*, 5(1), –18. <https://doi.org/10.1136/bmjopen-2014-006592>
- Fresco, D. M., Moore, M. T., van Dulmen, M. H. M., Segal, Z. V., Ma, S. H., Teasdale, J. D., & Williams, J. M. G. (2007). Initial psychometric properties of the Experiences Questionnaire: Validation of a self-report measure of decentering. *Behavior Therapy*, 38, 234–246. <https://doi.org/10.1016/j.beth.2006.08.003>
- Galhardo, A. (2012). *Infertilidade em Portugal: Aspectos psicológicos e estudo de eficácia do Programa Baseado no Mindfulness para a Infertilidade*. Doctoral Thesis: University of Coimbra, Coimbra.
- Galhardo, A., Cunha, M., & Pinto-Gouveia, J. (2013). Mindfulness-Based Program for Infertility: Efficacy study. *Fertility and Sterility*, 100, 1059–1067. <https://doi.org/10.1016/j.fertnstert.2013.05.036>
- Gilbert, P. (1998). What is shame? some core issues and controversies. In P. Gilbert, & B. Andrews (Eds.), *Shame: Interpersonal behaviour, psychopathology and culture* (pp. 3–36). New York: Oxford University Press.
- Gilbert, P., & Allan, S. (1998). The role of defeat and entrapment (arrested ight) in depression: An exploration of an evolutionary view. *Psychology Medicine*, 28, 585–598.
- Gilbert, P., & Irons, C. (2005). Focused therapies and compassionate mind training for shame and self-attacking. In P. Gilbert (Ed.), *Compassion: Conceptualisations, research and use in psychotherapy* (pp. 263–325). London: Routledge.
- Gregório, S., & Pinto-Gouveia, J. (2011). Facetas de mindfulness: características psicométricas de um instrumento de avaliação. *Psicologica*, 54, 259–279.
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, 57, 35–43. [https://doi.org/10.1016/S0022-3999\(03\)00573-7](https://doi.org/10.1016/S0022-3999(03)00573-7)
- Hammerli, K., Znoj, H., & Barth, J. (2009). The efficacy of psychological interventions for infertile patients: A meta-analysis examining mental health and pregnancy rate. *Human Reproduction Update*, 15, 279–295. <https://doi.org/10.1093/humupd/dmp002>
- Hansen, K. E., Kesmodel, U. S., Kold, M., & Forman, A. (2017). Long-term effects of mindfulness-based psychological intervention for coping with pain in endometriosis: A six-year follow-up on a pilot study. *Nordic Psychology*, 69, 100–109. <https://doi.org/10.1080/19012276.2016.1181562>
- Hayes, S. C., & Smith, S. (2005). *Get out of your mind and into your life: The new acceptance and commitment therapy*. Oakland: New Harbinger Publications, Inc.
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hayes, S. C., Wilson, K. W., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64, 1152–1168.
- Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, 78, 169–183. <https://doi.org/10.1037/a0018555>
- Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Dell Publishing.
- Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., et al. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, 33, 763–771. <https://doi.org/10.1016/j.cpr.2013.05.005>
- Kline, R. B. (2005). *Principles and practice of structural equation modelling 2nd ed.* New York: The Guilford Press.
- Li, J., Long, L., Liu, Y., He, W., & Li, M. (2016). Effects of a mindfulness-based intervention on fertility quality of life and pregnancy rates among women subjected to first in vitro fertilization treatment. *Behaviour Research and Therapy*, 77, 96–104. <https://doi.org/10.1016/j.brat.2015.12.010>
- Machell, K. A., Goodman, F. R., & Kashdan, T. B. (2015). Experiential avoidance and well-being: A daily diary analysis. *Cognition and Emotion*, 29, 351–359. <https://doi.org/10.1080/02699931.2014.911143>
- Marôco, J. (2010). *Análise estatística com o PASW Statistics*. Pêro Pinheiro. Report Number
- McIntyre, R., Smith, P., & Rimes, K. A. (2018). The role of self-criticism in common mental health difficulties in students: A systematic review of prospective studies. *Mental Health & Prevention*, 10, 13–27. <https://doi.org/10.1016/j.mhp.2018.02.003>
- Meadows, G. N., Shawyer, F., Enticott, J. C., Graham, A. L., Judd, F., Martin, P. R., ... Segal, Z. (2014). Mindfulness-based cognitive therapy for recurrent depression: A translational research study with 2-year follow-up. *Australian & New Zealand Journal of Psychiatry*, 48, 743–755.
- Moore, R. C., Depp, C. A., Wetherell, J. L., & Lenze, E. J. (2016). Ecological momentary assessment versus standard assessment instruments for measuring mindfulness, depressed mood, and anxiety among older

- adults. *Journal of Psychiatric Research*, 75, 116–123. <https://doi.org/10.1016/j.jpsychires.2016.01.011>
- Morgan, L. P. K., Graham, J. R., Hayes-Skelton, S. A., Orsillo, S. M., & Roemer, L. (2014). Empirical research: Relationships between amount of post-intervention mindfulness practice and follow-up outcome variables in an acceptance-based behavior therapy for generalized anxiety disorder: The importance of informal practice. *Journal of Contextual Behavioral Science*, 3, 173–176. <https://doi.org/10.1016/j.jcbs.2014.05.001>
- Pinto-Gouveia, J., Gregório, S., Dinis, A., & Xavier, A. (2012). Experiential avoidance in clinical and non-clinical sample. *International Journal of Psychology and Psychological Therapy*, 12, 139–156.
- Rocheftort, C., Baldwin, A. S., & Chmielewski, M. (2018). Experiential avoidance: An examination of the construct validity of the AAQ-II and MEAQ. *Behavior Therapy*, 49, 435–449. <https://doi.org/10.1016/j.beth.2017.08.008>
- Roemer, L., Orsillo, S. M., & Salters-Pedneault, K. (2008). Efficacy of an acceptance-based behavior therapy for generalized anxiety disorder: Evaluation in a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 76, 1083–1089. <https://doi.org/10.1037/a0012720>
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.
- Sherratt, K. A. L., & Lunn, S. (2013). Evaluation of a group programme of mindfulness-based cognitive therapy for women with fertility problems. *Journal of Obstetrics and Gynaecology*, 33, 499–501. <https://doi.org/10.3109/01443615.2013.786031>
- Spielberg, C. D. (1973). *Manual for State-Trait Anxiety Inventory (Form Y)*. Palo Alto, USA: Consulting Psychologists Press.
- Strauss, C., Cavanagh, K., Oliver, A., & Pettman, D. (2014). Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: A meta-analysis of randomised controlled trials. *PLoS One*, 9, e96110. <https://doi.org/10.1371/journal.pone.0096110>
- van Son, J., Nyklíček, I., Pop, V. J., Blonk, M. C., Erdtsieck, R. J., & Pouwer, F. (2014). Mindfulness-based cognitive therapy for people with diabetes and emotional problems: Long-term follow-up findings from the DiaMind randomized controlled trial. *Journal of Psychosomatic Research*, 77, 81–84. <https://doi.org/10.1016/j.jpsychores.2014.03.013>
- Vaz-Serra, A., & Abreu, J. (1973). Aferição dos quadros clínicos depressivos: Ensaio de aplicação do Inventário Depressivo de Beck a uma amostra de doentes deprimidos. *Coimbra Médica*, 20, 623–644.
- Vøllestad, J., Nielsen, M. B., & Nielsen, G. H. (2012). Mindfulness- and acceptance-based interventions for anxiety disorders: A systematic review and meta-analysis. *British Journal of Clinical Psychology*, 51, 239–260. <https://doi.org/10.1111/j.2044-8260.2011.02024.x>
- Zegers-Hochschild, F., Adamson, G. D., Dyer, S., Racowsky, C., de Mouzon, J., Sokol, R., ... van der Poel, S. (2017). The International Glossary on Infertility and Fertility Care, 2017. *Fertility and Sterility*, 108, 393–406. <https://doi.org/10.1016/j.fertnstert.2017.06.005>

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