Effectiveness of a Mindfulness-Based Intervention on Oncology Nurses' Burnout and

Compassion Fatigue Symptoms: A Non-Randomized Study

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Abstract

Background: Job stress and burnout are highly frequent in healthcare professionals, and prevalence in nurses can be as high as 40%. Mindfulness-based interventions have been shown to be effective in reducing stress and increasing well-being in a wide range of populations and contexts. However, controlled studies with healthcare professionals, and especially nurses, are scarce.

Objectives, design and setting: The aim of this study was to explore the effectiveness of an on-site, abbreviated mindfulness-based intervention for nurses, using a nonrandomized, wait-list comparison design. The effectiveness of the intervention was measured through several validated self-report measures that participants completed before and after the intervention, assessing burnout, compassion fatigue, psychological symptoms, mindfulness, self-compassion, experiential avoidances, rumination, and satisfaction with life.

Participants: A sample of 94 oncology nurses agreed to participate in the study and self-selected into an experimental ($n = 45$) and comparison condition ($n = 48$). Complete data was obtained for 48 of the initial 94 participants, mainly due to poor follow-up data rather than high drop-out rate.

Results: Statistical analyses included a series of 2x2 ANOVAs and ANCOVAs. Results indicated that nurses in the intervention reported significant decreases in compassion fatigue, burnout, stress, experiential avoidance, and increases in satisfaction with life, mindfulness and self-compassion, with medium to large effect sizes. Nurses in the comparison group didn't present significant changes in these variables. Results also pointed to a high degree of acceptability of the intervention.

Conclusions: This study provides preliminary evidence that mindfulness-based interventions may be efficacious in reducing oncology nurses' psychological symptoms and improving their overall well-being, and thus may be worthy of further study in this population.

Keywords: mindfulness-based intervention; burnout; compassion fatigue; stress; nurses; oncology

Introduction

Job stress and burnout are highly frequent in healthcare professionals (e.g., McCray, Cronholm, Bogner, Gallo, & Neill, 2008) and prevalence in nurses can be as high as 40% (Dominguez-Gomez, & Rutledge, 2009; Sermeus et al., 2011; Vahey, Aiken, Sloane, Clarke, & Vargas, 2004). Several studies have reported that stress and burnout in healthcare professionals are associated with several physical and mental health problems, such as fatigue, insomnia, hypertension, depression, and anxiety (e.g., Maslach, Schaufeli, & Leiter, 2001; Schulz et al., 2011). Stress and burnout also impact on professional effectiveness and have been associated with suboptimal patient care (Shanafelt, Bradley, Wipf, & Back 2002) and self-reported medical errors (Wes et al., 2006). In addition to the impact on healthcare professionals and patients' well-being, stress and burnout have potential economic costs to the organizations. It is estimated that stressed workers can be 46% more costly than non-stressed workers, and this number can as high as 147% if workers are also depressed (Goetzel et al., 1998).

Oncology nursing is one of the areas most affected by occupational stress and burnout (Barnard, Street, & Love, 2006; Potter et al., 2010). Oncology nursing involves the management of complex pathologies with poor prognosis, close and constant contact with patients who are in severe pain, distress and approaching death, and difficult patient and family situations, which poses an additional challenge to these professionals and further contributes to job dissatisfaction, stress and burnout (Barrett & Yates, 2002; Potter et al., 2010). In addition, oncology nursing is one area that has been particularly affected by the nursing shortage (e.g., Buerhaus, Donelan, DesRoches, Lamkin, & Mallory, 2001; Glaus, 2007), which significantly contributes to the job dissatisfaction, stress and burnout in oncology nurses, and increased intent to leave the profession (Toh, Ang, & Devi, 2012).

In contrast to the large body of research examining stress and burnout in healthcare professionals, little attention has been paid towards preventive interventions and the promotion of health and well-being. Among the most frequently identified and empirically-validated interventions to help address stress in several contexts are mindfulness-based interventions.

Mindfulness-based interventions (MBIs) are designed to teach participants to become more aware of thoughts, feelings and body sensations, while approaching these internal states with a non-judgmental curiosity. Mindfulness practice allows for greater awareness of the present moment, and helps cultivate healthier and adaptive ways of responding to stress, rather than habitual and often maladaptive reactions. The cultivation of concentration, attention, and non-judgemental acceptance of whatever is being experienced in the present moment is central to the practice of mindfulness (Bishop et al., 2004).

A meta-analysis of 20 studies in a wide-range of clinical populations found consistent improvements in depression, anxiety, coping style, and quality-of-life measures following Mindfulness-Based Stress Reduction (MBSR; Grossman, Niemann, Schmidt, & Walach, 2004). Recently, a meta-analysis concluded that MBSR is effective in reducing stress, depression, anxiety and distress and in ameliorating the quality of life, in nonclinical populations (Khoury, Sharma, Rusch, & Fournier, 2016). A recent review also outlined evidence to support the impact of mindfulness meditation on many stress-related medical conditions including psoriasis, type 2 diabetes, fibromyalgia, rheumatoid arthritis, and chronic low back pain, as well as reducing stress among individuals with chronic illness (Greeson, 2009).

Specific to the healthcare field, a systematic review and meta-analysis of 8 studies of the impact of MBIs on healthcare professionals' health and wellness found that participation in an MBI can have benefits for healthcare professionals in the domains of general and mental health, such as reduced stress, depression, anxiety, burnout, and improve self-compassion, mindfulness, physician empathy, sense of coherence and satisfaction with life (Burton, Burgess, Dean, Koutsopoulou, Hugh-Jones, 2016).

Although research on the impact of MBIs with nurses separate from other healthcare professionals is scarce, some studies have found significant improvements in burnout and psychological distress among nurses participating in a MBI compared to control groups (Cohen-Katz, Wiley, Capuano, Baker, & Shapiro, 2005; Mackenzie, Poulin, & Seidman-Carlson, 2006).

Traditional MBSR programs involve a serious time commitment: eight 2.5-h classes, one full-day retreat, and 45 min of meditation practice per day. As a result, recent studies have

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started to analyse the effects of adapted mindfulness interventions. In the healthcare field, for example, Mackenzie et al. (2006) found significant effects for burnout, relaxation, and life satisfaction in nursing students after a 4-week mindfulness intervention. Similarly, Fortney, Luchterhand, Zakletskaia, Zgierska, and Rakeparticipating (2013) found that an abbreviated mindfulness training course adapted for primary care clinicians was associated with reductions in indicators of job burnout, depression, anxiety, and stress.

Despite these promising findings, there is still a paucity of evidence-based studies that focus specifically on MBIs as an effective intervention for burnout, especially in nurses. Also, only one study to our knowledge explored the effectiveness of a MBI in a sample oncology nurses (paediatric; Moody et al., 2013). In addition, no studies to our knowledge explored the impact of a mindfulness intervention in reducing compassion fatigue. There is evidence to suggest that although related, burnout and compassion fatigue have different causes and symptoms (Bride, Radley & Figley, 2007). The term compassion fatigue has emerged in the literature in recent years and has been used interchangeably with secondary traumatic stress and vicarious trauma, because it is used to describe secondary stress reactions (e.g., re-experiencing the traumatic events, avoidance/ numbing of reminders, and persistent arousal) related to the provision of care to people who experienced some form of trauma or severe stress (Figley, 1995; Stamm, 2010). Oncology nurses may be especially vulnerable to compassion fatigue given the constant exposure to the suffering and trauma of their patients (Najjar, Davis, Beck-Coon, & Doebbeling, 2009). It has been suggested that without emotion regulatory skills, the repeated exposure to trauma, pain and suffering of others could be associated with adverse consequences such as distress and compassion fatigue (Decety, Yang, & Cheng, 2010), and impact on the ability to treat. Several studies elucidating the mechanisms of change associated with mindfulness training have suggested that meditation has an effect on brain areas associated with emotion regulation (see Chiesa, Serretti, & Jakobsen, 2013 for a review) and improves emotional adaptation through attention regulation (Desbordes et al., 2012). In addition, some studies have provided evidence that mindfulness interventions may be helpful in treating trauma-related symptoms (Bhatnagar et al., 2013; Nyklíček, Mommersteeg, Van Beugen,

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Ramakers, & Van Boxtel, 2013). Thus, we speculate that nurses undergoing mindfulness training develop better emotion regulation skills, which in turn may help them regulate their interpersonal sensitivity and negative arousal and protect against compassion fatigue.

This study aims to explore the effectiveness of an on-site mindfulness-based intervention on oncology nurses' psychological outcomes. It is hypothesised that, compared to a wait-list comparison group, participants receiving the MBI would experience decreases in symptoms of burnout, compassion fatigue, depression, anxiety and stress, and increases in satisfaction with life. Moreover, we hypothesized that the intervention would promote increases in trait mindfulness and self-compassion, and decreases in rumination and experiential avoidance.

<div align="center">Method</div>

Participants

Participants were recruited from two major oncology hospitals, located in the north and centre regions of Portugal, between 2013 and 2015. Individuals in this study were nurses who worked in direct contact with patients in their services. A total of 94 participants agreed to take part in the study. From these, one participant dropped-out before the intervention due to inconvenience. Participants who agreed to take part in the study were assigned to the experimental ($n = 45$) and waiting-list comparison conditions ($n = 48$). Full data were obtained from 48 of these initial 93, representing 52 % of participants initially recruited (29 in the experimental group and 19 in the waiting-list comparison group). The reason for the high level of attrition was failure to complete and return the post-intervention questionnaires, with the exception of two participants who dropped-out of the study. Only six participants completed the 3-month follow-up questionnaires, and thus these data were not analysed. The initial sample was composed by 82 female nurses (90.1%) and 9 male nurses (9.9%), with a mean age of 41 ($SD = 8.43$), ranging from 25 to 56 years. The majority of the sample was married or cohabiting ($n = 61$, 67%), 19 were single (20.7%), and 12 were divorced (13%). The mean years in practice was 17.90 ($SD = 8.60$), and the mean of years in the current position was 10.67 ($SD = 6.48$). The majority of nurses worked 40 hours per week (68.5%).

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Recruitment for this study was successful given that all places available in the MBI classes were filled. In addition, only two participants did not complete the intervention (at least 50% of the sessions).

All procedures were in accordance with the Helsinki Declaration of 1975. All participants provided their written informed consent. Participants did not receive any monetary compensation for taking part in this study. Participants received a certificate of attendance at the end of the intervention if they attended at least 50% of the sessions. The study was approved by the ethics committees and administration boards of both hospitals.

Procedure

Initial contacts were made by one of the authors of this study with two major oncology hospitals. After approval of the institutions' boards and ethics committees, the researcher collaborated with the hospitals' training offices. The training office was responsible for advertising the study among the nurses by intranet, for managing the allocation of each participant to the experimental and wait-list comparison group, and for delivering and collecting the questionnaires. After the participants' consent to be part of the research was obtained, participants were allocated to the experimental and wait-list comparison conditions. As a result of rotating shifts constrains, participants could not be randomly assigned to the groups, but rather self-selected according to their convenience. The intervention took place on site, during nurses' working schedule. All participants in the comparison group were offered the opportunity to access the course subsequently. Of the 48 participants in the comparison group, only 9 did not attend the MBI after the intervention group. The baseline package of questionnaires was delivered one week before the intervention and completed before session one. All participants were asked to complete their post-intervention questionnaires and return them in a sealed package to the training office.

Intervention

The intervention is a 6-week mindfulness-based group intervention, based generally on the principles and exercises of Mindfulness-Based Stress Reduction (Kabat-Zinn, 1982). The length of the program was adapted to make it easier to incorporate into nurses' work schedule.

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Key themes and practices were selected so as to fit into six sessions. Each session introduced a new theme and a different practice. In the first four sessions participants were taught mindfulness of the breath, body, (difficult) emotions and thoughts. The last two sessions dealt with loving-kindness and interpersonal relationships and covered mindful communication, the loving kindness meditation practice, and a closing reflection.

The final intervention consisted of six, two-hour group sessions, each of which included a didactic section and experiential exercises. The mindfulness-based program is outlined in Figure 1. Participants received a CD with guided meditation exercises with different lengths, which they were instructed to practice at home for at least 15 minutes per day. They also received a manual that summarised key points from the sessions, clarified homework requirements, and included a daily recording of their practice for each week. In the current study, the program was implemented by one of the authors who is a clinical psychologist and who is training in MBSR. The author has been practicing mindfulness for six years and attended several MBSR courses, retreats, and other training activities related to mindfulness and meditation.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Theme	Introducing mindfulness	Mindfulness of the body	Dealing with (difficult) emotions	The content of the mind	Compassion and loving-kindness	Mindful communication Keeping the practice alive
Exercises	Raisin exercise Sitting meditation with focus on the breath	Body scan meditation	Sitting meditation with awareness of breath and emotions 3-minute breathing space	Sitting meditation with awareness of breath and thoughts	Loving-kindness mediation focused on the self and others	Mindful communication exercises How to take better care of myself Letter to future me
Homework	Sitting meditation with focus on the breath Routine activity Eat one meal mindfully	Body scan or walking meditation Sitting meditation with awareness of breath and sensations New routine activity Pleasure events diary	Body scan or sitting meditation 3-minute breathing space Negative events diary	Body scan or sitting meditation 3-minute breathing space	Loving-kindness mediation Body scan or sitting meditation 3-minute breathing space	Continuing formal and informal mindfulness practice

Figure 1. Overview of the Mindfulness-Based Intervention

Measures

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Participants in the experimental group completed a battery of questionnaires before and immediately after the 6-week training program, and at 3-month follow-up. Participants in the comparison group completed the questionnaires during the same period, but not the 3-month follow-up measurement. All participants completed an after-intervention questionnaire designed for the purposes of this study to assess participants' at-home practice and acceptability of the program.

The Professional Quality of Life Scale, version 5 (ProQOL-5; Stamm, 2009). The ProQOL is a 30-item self-report measure composed by three subscales. The first subscale measures *compassion satisfaction* (CS), defined as the pleasure derived from being able to do one's work (helping others) well (e.g., "I get satisfaction from being able to help people"). Higher scores on this scale represent greater satisfaction related to one's ability to be an effective caregiver. The second subscale measures *burnout* (BO), or feelings of hopelessness and difficulties in dealing with work or in doing one's job effectively (e.g., "I feel worn out because of my work as a healthcare provider"). The third subscale measures *secondary traumatic stress* (STS), defined as work-related, secondary exposure to people who have experienced extremely or traumatically stressful events (e.g., "I feel depressed because of the traumatic experiences of the people I help"). Higher scores on these subscales indicate greater levels of burnout and compassion fatigue. Given that the terms 'compassion fatigue' and 'secondary traumatic stress' have been used interchangeably in the literature, we will use the term 'compassion fatigue' to refer to this factor. Respondents are instructed to indicate how frequently each item was experienced in the previous 30 days, on a 5-item Likert scale (from 1 = 'never' to 5 = 'very often'). Scoring requires summing the item responses for each 10-item subscale. The original and Portuguese versions of the scale showed good psychometric properties (Stamm, 2009; Carvalho, 2011). Cronbach's alphas in the present study were .91 for compassion satisfaction, .78 for burnout, and .61 for compassion fatigue.

Depression, Anxiety, Stress Scale (DASS-21; Lovibond & Lovibond, 1995; Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS-21 comprises 3 subscales, each with 14 items, measuring depression, anxiety and stress symptoms. Participants were asked to indicate

the degree to which each statement applied to them in the last two weeks. The DASS-21 uses a 4-point rating scale (0 = Did not apply to me at all to 3 = Applied to me very much, or most of the time). Validity and reliability of this scale across different samples has been well established (e.g., Lovibond & Lovibon 1995; Pais-Ribeiro, Honrado, & Leal, 2004). Subscale scores were computed by calculating the sum of subscale item responses, and higher scores indicate higher levels of psychological symptoms. Cronbach's alpha in the present study were .88 for depression, .83 for anxiety, and .89 for stress.

Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011). The AAQ-II is a 7-item measure of psychological inflexibility/experiential avoidance. Answers are given on a 7-point scale ranging from 1= 'never true' to 7 = 'always true'. The Portuguese version of the scale showed good internal consistency and good convergent and discriminant validity (Pinto-Gouveia, et al., 2012). Higher scores indicate greater experiential avoidance. Cronbach's alpha was .91 for the total scale in the present study.

Ruminative Responses Scale-Short (RRS; Treynor, Gonzalez e Nolen-Hoeksema, 2003). This scale consists of 10 items from the original list of 22 that was developed by Nolen-Hoeksema and Morrow (1991), and is composed by two factors. The authors described the *Reflection* factor as engaging in contemplation to alleviate negative mood (e.g., 'Write down what you are thinking and analyse it'), whereas the *Brooding* factor was described as thinking anxiously or gloomily about problems or difficulties (e.g., 'Think "Why do I always react this way?"). This scale showed good psychometric properties in the original (Treynor et al., 2003) and Portuguese versions (Dinis, Pinto-Gouveia, Duarte, & Castro, 2011). Higher scores indicate greater brooding and reflective thinking. Cronbach's alphas were .70 for brooding and .77 for reflective thinking in the present study.

The Five Facets of Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This questionnaire consists of 39 items that assess five facets of mindfulness. Items are rated on a Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). The factors include: *observing*, defined as noticing or attending to internal and external experiences such as sensations, thoughts, or emotions (e.g., 'I pay attention

to sensations, such as the wind in my hair or sun on my face'); *describing*, which refers to labelling internal experiences with words (e.g., 'It's hard for me to find the words to describe what I'm thinking', reversed); *acting with awareness*, which includes focusing on one's activities in the moment as opposed to behaving mechanically (e.g., 'I rush through activities without being really attentive to them', reversed); *non-judging of inner experience*, which refers to taking a non-evaluative stance toward thoughts and feelings (e.g., 'I tell myself that I shouldn't be thinking the way I'm thinking', reversed); and *non-reactivity to inner experience*, which refers to allowing thoughts and feelings to come and go, without getting caught up in or carried away by them (e.g., 'When I have distressing thoughts or images I am able just to notice them without reacting'). The original and Portuguese versions (Gregório & Pinto-Gouveia, 2011) of the scale showed good psychometric properties. Higher scores indicate greater mindfulness. Cronbach's alphas were .83 for observe, .90 for describe, .90 for acting with awareness, .84 for non-judging, and .72 for non-reacting, in the present study.

Self-Compassion Scale (SCS; Neff, 2003). The SCS is a widely used self-report measure developed to assess six components of self-compassion: *self-kindness* ("I try to be understanding and patient toward those aspects of my personality I don't like"); *self-judgment* ("I'm disapproving and judgmental about my own flaws and inadequacies"); *common humanity* ("I try to see my failings as part of the human condition"); *isolation* ("When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world"); *mindfulness* ("When something painful happens I try to take a balanced view of the situation"); and *over-identification* ("When I'm feeling down I tend to obsess and fixate on everything that's wrong"). Scores on the six subscales were summed (after reverse-coding negative items) to create an overall self-compassion score. Items are rated on a 5-point scale (e.g., 1 = 'almost never' to 5 = 'almost always'). The SCS has adequate construct and convergent validity (Neff, 2003b). The Portuguese version of the scale also showed good internal consistency and validity (Castilho, Pinto-Gouveia, & Duarte, 2015). SCS scores are presented so that higher scores indicate greater self-compassion. Cronbach's alphas I the present study were .92 for the total

scale, .87 for self-kindness, .69 for self-judgment, .79 for common humanity, .83 for isolation, .82 for mindfulness, and .75 for over-identification.

Satisfaction with Life Scale (SWL; Diener, Emmons, Larsen, & Griffins, 1985). This is a 5-item scale designed to measure global cognitive judgments of one's life satisfaction. Participants indicate how much they agree or disagree with each of the 5 items using a 7-point scale that ranges from 7 strongly agree to 1 strongly disagree. The original and the Portuguese versions of the scale showed good psychometric properties (Laranjeira, 2009). Higher scores indicate greater satisfaction with life. Cronbach's alpha was .90 in the present study.

Statistical Analyses

A priori power analyses conducted using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that a sample of 24 participants in total would yield 80% power to detect significant interaction effects of condition and time, with a medium effect size (f = 0.25) and a two-tailed α of 0.05. Correcting for multiple outcomes, by choosing a smaller value of α (0.002 using Bonferroni correction) with the same power and effect size, would require 44 participants in total. Due to potential attrition a larger sample size was recruited.

Baseline differences were examined between the experimental and comparison groups on all measures and demographics. Gender differences were not tested due to the small number of males in the sample.

To directly test the prediction related to change in the outcomes (professional quality of life, depression, anxiety and stress, and satisfaction with life) and mechanisms (mindfulness, experiential avoidance, rumination and self-compassion), a series of 2 (condition) by 2 (time) repeated measures Analysis of Variance (ANOVA) were conducted. To interpret the meaning of these interactions, tests of simple main effects with Sidak correction were computed. These analyses were also computed to explore whether the amount of meditation practice would have an effect on change in the dependent measures. In addition, we conducted a series of sensitivity analyses to see if the results of the main analyses would hold. To this end, a series of Analyses of Covariance (ANCOVAs) were calculated to examine the differences between the experimental and comparison groups on post-intervention scores, while controlling for baseline

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scores of the same measure. Although some studies used the FFMQ total score in the past, there is not sufficient evidence for its validity, particularly due to how the Observing facet operates in different samples (e.g., meditators and non-meditator; Baer et al., 2006). Also, using the facets of mindfulness is likely to improve our understanding of the specific skills that are cultivated through the practice of mindfulness and how these are related to psychological adjustment. Lastly, we examined descriptive statistics relating to nurses' feedback regarding the intervention to gauge its acceptability among those in the intervention group.

There were no missing data, and the number of cases was similar in all analyses. An evaluation of skewness and kurtosis was conducted to assess the assumption of normality. According to Kline (2005), skewness values above 3 and kurtosis values above 10 indicate severe deviations to normal distribution.

Effect sizes for the ANOVAs were calculated using partial eta squares (η^2), with .01 indicating a small effect size, .06 a medium effect size and .14 a large effect size (Tabachnick & Fidell, 2013). The effect sizes for the paired samples t-tests were calculated using Cohen's d, with 0.2 indicating a small effect, 0.5 a medium effect and 0.8 a large effect (Cohen, 1988).

The alpha level was set at .05 for all analyses conducted in this study. The statistical procedures were computed with the software IBM SPSS (v. 20).

<div align="center">Results</div>

Samples' Characteristics

The final sample in which the analyses were conducted was composed by 29 nurses in the experimental group and 19 nurses in the wait-list comparison group. The intervention group was composed by 26 female nurses and 3 male nurses, with a mean age of 38.90 ($SD = 8.34$), ranging from 25 to 54 years. The majority of the sample was married or cohabiting ($n = 24$, 75.9%), 5 were single (17.2%), and 2 were divorced (6.9%). The mean years in practice was 15.92 ($SD = 7.84$), and the mean of years in the current position was 10.29 ($SD = 7.00$). The majority of nurses worked 40 or 35 hours per week (48.3%). The comparison group was composed by 16 female nurses and 3 male nurses, with a mean age of 42.11 ($SD = 8.43$), ranging from 30 to 55 years. The majority of the sample was married or cohabiting ($n = 12$,

63.2%), 5 were single (26.3%), and 2 were divorced (10.5%). The mean years in practice was

19.74 (SD = 9.28), and the mean of years in the current position was 10.74 (SD = 5.93). The

majority of nurses worked 40 hours per week (78.9%). Participants were also asked regarding

previous mediation experience. Of the total sample, 10 participants referred they experienced

mediation in the past (3 in the comparison group and 7 in the experimental group). However, no

participant reported having daily and frequent meditation practice at the time of study.

Baseline Differences between Experimental and Comparison Groups

Chi-squared analyses revealed that there were no significant differences between

participants in the intervention and comparison conditions regarding gender and marital status.

No significant differences regarding age, years of schooling, years of practice and years in the

current position were found between groups. Independent samples' t-tests suggested that the

comparison group presented significant higher levels of observing (FFMQ) at baseline when

compared to the intervention group, $t(46) = 2.21$, $p = .03$, $d = .43$, 95% CI [0.34 – 7.44]. Also,

no significant differences regarding previous meditation experience were found between the

groups.

Effects of the Intervention: Between-Groups Differences

Several repeated measures ANOVA were conducted to examine changes across time

between the intervention and comparison conditions on measures of compassion satisfaction,

burnout, compassion fatigue, psychological symptoms and satisfaction with life (outcomes) and

psychological mechanisms. Table 1 summarizes descriptive statistics of mean scores of pre–

post measures and significance of time and time-group interaction.

Regarding the outcome measures, we found a significant interaction between time and

condition only for compassion fatigue. Tests of simple main effects with Sidak correction

suggested that there was a significant decreased of compassion fatigue from pre to posttest in

the intervention groups ($F = 18.60$, $p < .001$, partial $\eta^2 = .29$), but not in the comparison group F

$= 0.50$, $p = .483$, partial $\eta^2 = .01$).

Regarding psychological mechanisms, we found significant time and condition

interaction effects for experiential avoidance, self-compassion (common-humanity, isolation

and total score), and mindfulness (observing and non-judging). Tests of simple main effects with Sidak correction revealed significant decreases from pre to posttest in experiential avoidance ($F = 13.15$, $p = .001$, partial $\eta^2 = .22$), and increases in mindfulness ($F = 5.26$, $p = .026$, partial $\eta^2 = .10$), SCS total score ($F = 5.79$, $p = .020$, partial $\eta^2 = .11$), observing ($F = 7.53$, $p = .009$, partial $\eta^2 = .14$), and non-judging ($F = 5.45$, $p = .024$, partial $\eta^2 = .10$), in the intervention group. In contrast, no significant differences between pre and posttest scores were found in the comparison group. Figures 2 and 3 provide a graphical representation of the results for one outcome and one psychological mechanism. Although no significant interactions were found for the remaining variables, we found that there were significant decreases on burnout, $F = 10.65$, $p = .002$, partial $\eta^2 = .19$, stress, $F = 7.73$, $p = .008$, partial $\eta^2 = .14$, and over-identification, $F = 4.79$, $p = .034$, partial $\eta^2 = .09$, and significant increases in mindfulness (SCS), $F = 5.26$, $p = .026$, partial $\eta^2 = .10$, non-reacting, $F = 4.40$, $p = .041$, partial $\eta^2 = .09$, and satisfaction with life, $F = 5.33$, $p = .026$, partial $\eta^2 = .11$, in the intervention group but no significant changes were found for the comparison group.

Table 1

Means, SDs at Time 1 (Pretest) and Time 2 (Posttest), Time Main Effect, and Time Group Interaction Effect (n = 48).

Variable	Time	Experimental		Comparison		Time			Time X Group		
		M	SD	M	SD	F	p	Partial η^2	F	p	Partial η^2
Compassion Satisfaction	1	36.96	6.19	39.68	4.73	1.42	.240	.03	.08	.777	.00
	2	37.82	6.04	40.20	5.50						
Burnout	1	26.57	6.09	24.74	4.64	8.06	.007	.15	1.72	.197	.04
	2	24.29	5.09	23.89	4.82						
Compassion Fatigue	1	25.71	3.47	26.53	3.60	10.81	.002	.19	4.82	.033	.10
	2	23.07	3.53	26.00	3.54						
Depression	1	2.83	2.29	3.37	4.45	.90	.349	.02	.49	.490	.01
	2	2.14	2.07	3.26	4.81						
Anxiety	1	1.86	1.71	3.21	4.26	.00	.988	.00	.43	.517	.00
	2	1.59	1.99	3.47	4.88						
Stress	1	7.03	4.08	8.05	4.74	4.48	.040	.09	1.91	.172	.04
	2	5.28	3.53	7.68	5.23						
Experiential Avoidance	1	22.31	7.37	21.45	9.47	6.59	.013	.12	4.23	.044	.08
	2	18.62	7.10	21.05	9.49						
Rumination_Reflective	1	8.38	2.81	9.90	2.65	.26	.611	.01	1.92	.173	.04
	2	8.72	2.28	9.15	2.50						
Rumination_Brooding	1	8.62	2.38	8.20	2.35	3.46	.069	.07	.62	.436	.01
	2	7.76	1.92	7.85	2.83						

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	Group	M	SD	M	SD	F	p	η²	F	p	η²
Observing (FFMQ)	1	23.72	6.41	27.30	5.23	.27	.609	.01	8.94	.004	.16
	2	26.34	6.07	25.45	5.32						
Describing (FFMQ)	1	27.66	5.72	26.95	6.30	3.56	.065	.07	.94	.336	.02
	2	28.10	5.27	28.35	5.46						
Acting with Awareness	1	28.21	6.79	30.00	5.08	1.46	.233	.03	2.64	.111	.05
(FFMQ)	2	28.55	5.51	27.65	6.77						
Non-judging (FFMQ)	1	25.24	4.35	27.00	6.63	.37	.547	.01	5.65	.022	.11
	2	27.52	5.35	25.65	5.38						
Non-reacting (FFMQ)	1	19.52	4.95	20.15	3.95	1.33	.254	.03	2.32	.134	.05
	2	20.97	4.08	19.95	4.69						
Self-Kindness (SCS)	1	14.46	4.02	16.15	3.45	.47	.497	.01	1.52	.224	.03
	2	14.68	4.07	15.40	3.62						
Self-Judgment (SCS)	1	13.82	3.29	13.80	3.44	.12	.726	.00	.30	.588	.01
	2	13.36	4.13	13.90	4.17						
Common humanity	1	12.76	3.48	13.95	2.89	.02	.889	.00	5.11	.029	.10
(SCS)	2	13.55	3.00	13.25	3.11						
Isolation (SCS)	1	10.71	3.62	9.35	3.07	3.06	.087	.06	5.24	.027	.10
	2	9.21	2.75	9.55	2.84						
Mindfulness (SCS)	1	12.46	3.13	13.65	2.43	1.14	.292	.02	3.59	.064	.07
	2	13.18	2.93	13.45	2.70						
Over-identification	1	11.29	3.05	10.50	3.22	1.80	.187	.04	2.21	.144	.05
(SCS)	2	10.32	2.84	10.55	3.62						

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	Time	M	SD	M	SD	F	p	η²	F	p	η²
Total SCS	1	81.89	16.35	88.10	14.31	.79	.378	.02	4.92	.032	.10
	2	86.57	16.05	86.10	16.59						
Satisfaction with life	1	23.36	6.27	25.11	5.77	3.18	.081	.07	1.33	.255	.03
	2	25.07	4.78	25.47	6.02						

Note. Time 1 = Pretest; Time 2 = Posttest; SCS = Self-Compassion Scale; FFMQ = Five Facets of Mindfulness Questionnaire; Partial η^2 = .01 small effect size, = .06 medium effect size, = .14 large effect size.
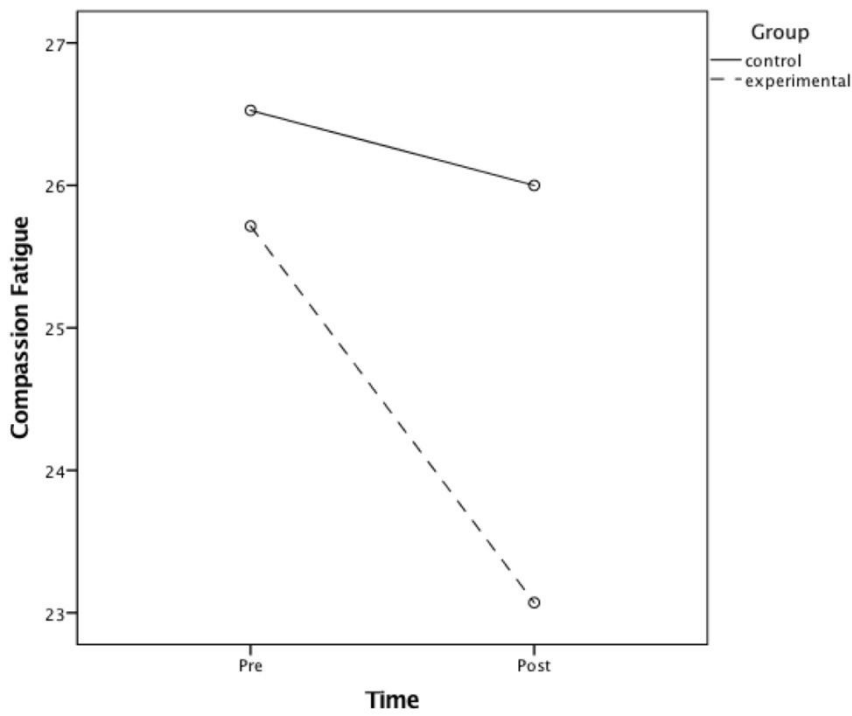
Figure 2. Pretest and Posttest Means in Compassion Fatigue for the Experimental and Control Group
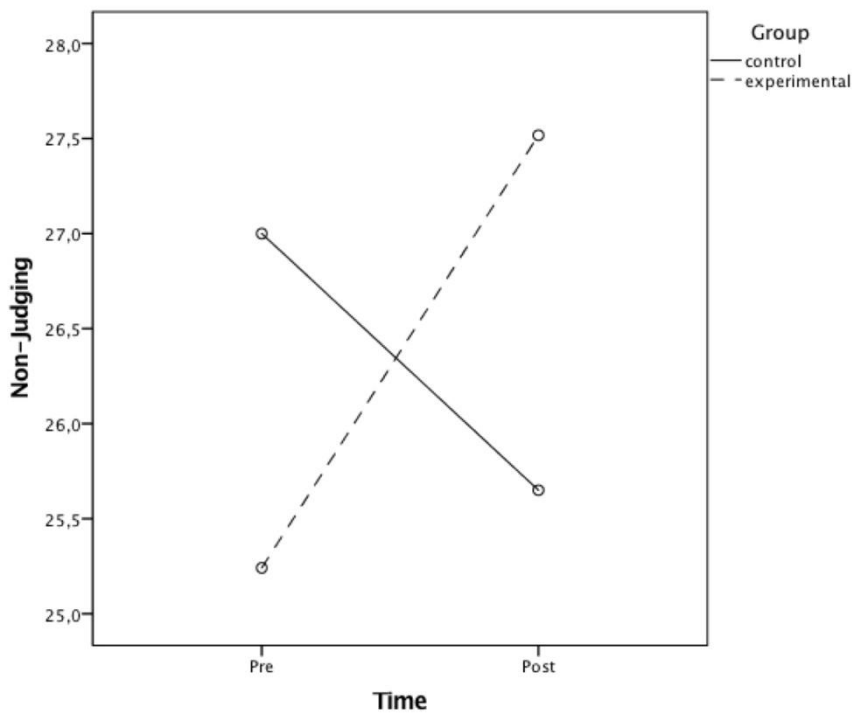
Figure 3. Pretest and Posttest Means in the Non-Judging Facet of Mindfulness for the Experimental and Control Group

Post-intervention Differences Controlling for Pretest

As an additional test of the intervention effects, we conducted a series of follow-up ANCOVAs that examine whether the post-test means, adjusted for pretest scores, differed between the intervention and the comparison group. Even after controlling for baseline effects, the analyses revealed significant differences between the intervention and comparison groups in post-intervention scores of compassion fatigue, $F(1, 46) = 7.9$, $p = .01$, partial $\eta^2 = .15$, experiential avoidance, $F(1, 48) = 4.20$, $p = .04$, partial $\eta^2 = .08$, observing, $F(1, 46) = 4.72$, $p = .04$, partial $\eta^2 = .09$, and non-judging, $F(1, 46) = 4.19$, $p = .04$, partial $\eta^2 = .08$, with medium and large effect sizes. The analyses showed that individuals in the intervention condition scored significantly lower on compassion fatigue, experience avoidance, and significantly higher in observing and non-judging, than those in the comparison group at post-intervention.

Differences Between Frequency of Practice

To explore the possible effect of frequency of practice, we conducted repeated measures ANOVAs, with time (pre and post) as the within-subjects factor and practice (low and high) as the between-subjects factor. The variable 'practice' was measured using a scale from 1 (once a week) to 7 (everyday, more than once a day). We created two groups based on the cut points for two equal groups in the present sample. These analyses revealed significant interactions between time and practice, namely in burnout, $F(1, 24) = 4.85$, $p = .038$, partial $\eta^2 = .17$, depression, $F(1, 25) = 8.51$, $p = .007$, partial $\eta^2 = .25$, isolation, $F(1, 24) = 15.24$, $p = .001$, partial $\eta^2 = .39$, over-identification, $F(1, 24) = 9.23$, $p = .006$, partial $\eta^2 = .28$, and SCS total score, $F(1, 24) = 7.34$, $p = .012$, partial $\eta^2 = .23$, with large effect sizes. Tests of simple main effects with Sidak correction revealed that the change in these variables from pretest to posttest was significant for participants who practiced more, but not for participants who practiced less.

Descriptive Statistics of Feedback from the Nurses in the Intervention

We examined descriptive statistics of feedback from the nurses in the intervention condition. When nurses were asked whether they learned something important from the intervention for their lives, 98% reported 'yes'. Moreover, 72.5% reported they made some change in their lifestyle as a result of participating in the intervention. Additionally, 70.6%

reported they changed the way they perceive and respond to stressful situations, and 80.4%

think their relationship with thoughts and emotional states changed for the better. Finally, when

asked to rate the importance of the intervention on a scale from 0 (not important) to 10 (very

important), the majority of participants rated the intervention as 7 ($n = 17$; 33.3%), followed by

8 ($n = 9$; 17.6%), 5 ($n = 9$; 17.6%), and 6 ($n = 7$; 13.7%). Three participants rated the

intervention as 9 (5.9%) and 10 (5.9%). Finally, two participants rated the intervention as 2

(3.9%) and one participant as 4 (2.0%).

Discussion

The present study explored the effectiveness and acceptability of a modified

mindfulness-based program for oncology nurses. A sample of nurses recruited from two

oncology hospitals self-selected into either a wait-list comparison condition (no intervention

offered) or a mindfulness intervention condition. We predicted that individuals undergoing the

mindfulness intervention would experience reductions in burnout, compassion fatigue,

depressive, anxious and stress symptoms, experiential avoidance and rumination, and increases

in compassion satisfaction, mindfulness, self-compassion and satisfaction with life.

Regarding the primary outcome variables, we found that nurses in the experimental

condition reported a significant reduction in compassion fatigue after the intervention compared

with individuals in the comparison condition. These effects held even when controlling for

baseline imbalances between the two groups in the ANCOVA, with a large effect size. This is

the first study to our knowledge to explore the impact of a mindfulness-based intervention on

symptoms of compassion fatigue. Compassion fatigue is described as a secondary traumatic

reaction that results from the close contact with other people's suffering or trauma, and yields

an almost identical set of symptoms to those of PTSD. Nurses, and especially oncology nurses,

are at a particular risk of developing compassion fatigue, because they constantly witness and

contact intense suffering, pain and trauma of others (e.g., Najjar et al., 2003). It has been

suggested that without emotion regulatory skills, the repeated exposure to trauma, pain and

suffering of others could be associated with adverse consequences such as compassion fatigue

(Decety, Yang, & Cheng, 2010). Several studies elucidating the mechanisms of change

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associated with mindfulness training have suggested that meditation has an effect on brain areas associated with emotion regulation (see Chiesa, Serretti, & Jakobsen, 2013 for a review) and improves emotional adaptation through attention regulation (Desbordes et al., 2012). In addition, some studies have provided evidence that mindfulness interventions may be helpful in treating trauma-related symptoms (Bhatnagar et al., 2013; Nyklíček, Mommersteeg, Van Beugen, Ramakers, & Van Boxtel, 2013). Thus, we hypothesise that one way through which mindfulness training may reduce compassion fatigue in nurses is the development of emotion regulation skills.

Results also suggested that nurses receiving the mindfulness training reported significant decreases in burnout and stress, and greater satisfaction with life, while nurses in the comparison condition didn't present significant changes in these variables. These findings highlight the importance of mindfulness training in nurses' well-being, and are in line with previous research on mindfulness with healthcare professionals. For example, studies with mixed samples of healthcare staff showed improvements in stress reduction and negative affect (Marx, Strauss, Williamson, Karunavira, & Taravajra, 2014; Shapiro, Brown, & Biegel, 2007), and burnout (Fortney et al., 2013; Galantino et al., 2005; Krasner et al., 2009; Rosenzweig, Reibel, Greeson, & Brainard, 2003; Shapiro et al., 2005). Studies with nurses also found reductions in burnout, depression, anxiety and stress after a mindfulness intervention (Bazarko, Cate, Azocar, & Kreitzer, 2013; Cohen-Katz et al., 2005; Mckenzie et al. 2006). Our results are also in line with a recent meta-analysis of MBSR studies with healthy individuals that found large effects on stress, moderate effects on anxiety, depression, distress, and quality of life, and small effects on burnout (Khoury et al., 2015).

Regarding psychological processes, and in line with the study predictions, we found a significant decrease in experiential avoidance and increases in self-compassion and mindfulness in the nurses who took part in the intervention group from pretest to posttest. The results for experiential avoidance and mindfulness (observing and non-judging) held in all analyses, with medium to large effects sizes.

These results are in line with previous studies that found that participating in a MBI leads to increases in trait mindfulness and self-compassion (e.g., Keng, Smoski, Robins, & Brantley, 2012). Studies with healthcare staff (Krasner et al., 2009; Marx et al., 2014; Shapiro et al., 2005, 2007), and nurses (Bazarko et al, 2013; Cohen-Katz et al., 2005) also found similar results. No previous studies to our knowledge explored the effects of a MBI on experiential avoidance in healthcare staff, and only one controlled study examined whether MBI participation was associated with decreased experiential avoidance (Labelle, Campbell, Faris, & Carlson, 2014).

We also examined whether the amount of practice over the intervention period was related to changes in the variables. Results suggested that the nurses who practiced more showed greater decreases in burnout and depression, and greater increases in self-compassion, when compared to the nurses' who practiced less. The relationship between meditation practice and changes in outcomes has yield mixed findings in previous studies. A review of the mindfulness intervention literature with a focus on the status of home practice research and the relationship of practice to mindfulness outcomes indicated equivocal support for the hypothesis that practice would relate positively to change over treatment (Vettese, Toneatto, Stea, Nguyen, & Wang, 2009). It is interesting to note that, in this study, amount of practice was related to changes in self-compassion but not mindfulness. This finding may support some of the concerns raised regarding the FFMQ as a valid measure of mindfulness, such as lack of construct validity (e.g.,Visted, Vøllestad, Nielsen, & Nielsen, 2015). However, the relationship of practice time and outcomes was a secondary aim of the present study, and thus these results should be interpreted with caution. Our analysis was post hoc and unsystematic, and we didn't use a reliable and valid method for evaluating homework reporting and compliance, or the quality of participants' meditation practice.

Finally, we assessed the acceptability of the mindfulness intervention by asking nurses several questions related to their experience of being a participant. Overall, results indicated that most participants learned something important from the program, made important changes in their lives as a result of being enrolled in the program, changed the way they perceive and

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respond to stressful situations, as well as the relationship with their thoughts and emotional states. Most participants also rated the program as very important. These results point to a high degree of acceptability of the intervention.

Overall, these results suggest that mindfulness training may improve oncology nurses' quality of life, adding to the large body of empirical research on the positive effects of MBIs.

This study has several strengths. First, there are only a handful of studies that assess the efficacy of MBI in nurses, and only one in oncology nurses, and thus this study addresses a major scarcity in the field. There are more studies with mixed populations of nursing, medical and other health professionals, and students at various stages of training. However, research with more homogenous samples is important in order to examine the specific demands and advantages of the program and to determine the benefits of introducing such programs.

Also, this study explored the effectiveness of a shorter MBI on site, which can be more easily fitted into the schedules of hospital nurses. Despite the scheduling issues in this population, the intervention had low attrition rates due to drop-outs. For example, in a previous study with healthcare professionals (Shapiro et al., 2005), forty-four percent of the MBSR group did not complete the intervention due to lack of time and increased responsibility. Several reasons may have contributed to the high attendance rates. First, there was a straight collaboration between the research team and the hospitals' training offices. These offices are responsible for providing continuous training to the healthcare staff in several areas. Including the present intervention as part of the training activities of the hospital allowed us to conduct the intervention on site, during nurses' working schedule. In addition, participants received a certificate of attendance from the training office if they completed at least 50% of the sessions. However, it should be noted that the lack of randomization may have also contributed to the high attendance rates. In addition, this study used a comparison condition, which provides more confidence on the effects observed in the experimental condition. The effects found, with moderate to large sizes, are promising and can inform further research.

This study is not without limitations. The sample size was relatively small and most participants were women. It is possible that men and women may respond differently to the

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mindfulness intervention, but the sample size of males in the present study didn't allow to test possible effects of gender. Also, this study used a non-randomized allocation of participants, and thus there may be non-random significant differences between the two groups that influenced the findings. However, given that all participants knew they would receive the mindfulness training, and self-selected into the experimental and comparison conditions according to their services' schedules, we believe that the effect of motivational differences on their experience in the program would be small. The lack of a follow-up assessment does not allow to assess the maintenance of the positive effects over time. It is possible that the large number of questionnaires administered could have contributed to the low response rate at follow-up, and this should be taken into account in future studies. In addition, it should be noted that results from this study apply only to the present sample and not to all oncology nurses. Replication studies with other samples of oncology nurses, working in different settings, are needed to corroborate the present findings. Also, this study relied entirely on the use of self-report measures and suffers from the limitations associated with this type of methodology (e.g., response bias, introspective ability). Finally, this was a non-clinical sample, which may explain some of the non-significant results.

Future studies could explore whether the positive effects of the mindfulness intervention extend beyond the individual nurse participating in the intervention, and reflect in improved patient care and nurses' clinical environments. Also, it could be explored whether the intervention has impact on organizational variables, such absenteeism and turnover. Including combined research methods, such as in-depth interviews and third-parties' records (e.g., patients) could also be an interesting direction for future studies. In addition, greater attention should be directed towards behavioural variables, such as adherence, in order to assess the frequency and quality of mindfulness practice. Finally, it is also of paramount importance to better understand which underlying mechanisms during MBIs are associated with its efficacy. For example, it was recently found that burnout symptoms were associated with impairments in several cortical areas associated with high-order cognitive function (e.g., dorsolateral prefrontal cortex, posterior cingulate cortex, frontal gyrus), which may explain how burnout impact on

clinical reasoning and the quality of patient care (Durning, 2013). Interestingly, recent findings from functional neuroimaging studies are suggesting that mindfulness may change brain function is these same areas (e.g., Marchand, 2014).

Conclusion

Oncology nursing is one area that has been particularly affected by the global nursing shortage (e.g., Buerhaus, et al., 2001; Glaus, 2007). Moreover, projections from the World Cancer Report show that cancer rates may increase up to 50% to 15 million new cases by the year 2020. (World Health Organization, 2003). These statistics suggest that the number of oncology nurses is far from adequate to meet current and future needs. According to previous studies, nursing shortage significantly contributes to the job dissatisfaction, stress and burnout in oncology nurses, and increased intent to leave the profession (Toh et al., 2012).

The results of this study are timely and provide preliminary evidence that mindfulness-based interventions may be efficacious in reducing oncology nurses' burnout, compassion fatigue and stress levels and increase their overall well-being.

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