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## Quality of life in patients with mild Alzheimer disease: the mediator role of mindfulness and spirituality

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### ABSTRACT

**Objectives:** This study examined the mediator role of mindfulness and spirituality in the relationship between psychological morbidity, awareness of the disease, functionality, social support, family satisfaction, and quality of life (QoL) in patients with mild AD.

**Method:** The sample consisted of 128 patients who answered the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R), the Assessment Scale of Psychosocial Impact of the Diagnosis of Dementia (ASPIDD), the Hospital Anxiety and Depression Scales (HADS), the Satisfaction with Social Support Scale (SSSS), the Family Satisfaction Scale (FSS), the Spiritual and Religious Attitudes in Dealing with Illness (SpREUK), the Index of Barthel, and the Quality of Life-Alzheimer's Disease (QoL-AD).

**Results:** Mindfulness and spirituality mediated the relationship between functionality, awareness of the disease, family satisfaction and QoL. Psychological morbidity had a direct negative impact on QoL and was negatively associated with awareness of the disease, family satisfaction and social support. Mindfulness was negatively associated with spirituality and the latter was negatively associated with QoL. More social support was associated with greater awareness of the disease and family satisfaction. More functionality, awareness of the disease and family satisfaction contributed to more QoL and this relationship was mediated by mindfulness and spirituality.

**Conclusion:** Interventions directed at the promotion of the QoL of patients with mild AD should focus on the promotion of mindfulness skills in AD patients, in addition to the reduction of psychological morbidity and the promotion of functionality, awareness of the disease, family relationships and social support.

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### KEYWORDS

Quality of life; Alzheimer disease; mindfulness; spirituality

### Introduction

Alzheimer's Disease (AD) is characterized by the progressive development of cognitive deficits that include impairment of memory and cognitive disorders, apraxia, agnosia, and disturbance in executive functioning (Alzheimer's Association, 2014), along with pathophysiological changes that define the clinical stages of dementia. The World Report of Alzheimer (Alzheimer's Disease International, 2015) reports that 46.8 million people have dementia, 12–13% higher than the estimate made in the 2009 report, and this number is expected to increase to 131.5 million people worldwide by 2050.

AD is one of the five leading causes of death (Carpenter et al., 2008) in the US, as well as in Portugal, and the most prevalent type of dementia in the population. It is also estimated that about 90.000 people suffer from AD, in Portugal (Alzheimer's Association, 2014). Patients with AD show physical (e.g., apraxia, motor coordination difficulties, uncontrolled sphincter) and cognitive (e.g., changes in memory, language) impairment (Alzheimer's Association, 2017) with a profound negative impact on their quality of life (QoL). Since AD is a chronic and incurable disease, maintaining and improving QoL is considered the ultimate outcome in the treatment and care. As a result, QoL, a global and multifaceted health indicator, represents an important domain for dementia monitoring, being frequently

used to measure the effectiveness of interventions directed at AD patients (Kahle-Wroblewski et al., 2016).

The majority of studies have focused on the impact of psychosocial factors in the QoL of patients with AD, solely from the perspective of their caregivers. However, in mild AD the awareness of the disease is preserved (Lima, Gago, Garrett, & Pereira, 2016), and therefore, is important to understand how patients perceive the disease and adjust to the functional and cognitive disabilities (Dourado, Laks, Leibing, & Engelhardt, 2006; Lima et al., 2016). Knowing the patients' own perception of the impact of AD will also allow to develop interventions tailored to this population's needs. To that end, this study focuses on the patients' perceptions of their own psychological morbidity, functionality, awareness of the disease, family satisfaction, social support, mindfulness, spirituality and QoL.

Mindfulness consists in being aware of present experiences (physical sensations, thoughts and feelings/emotions) that may emerge from an event, with an attitude of acceptance and non-judgment (Kabat-Zinn, Lipworth, & Burney, 1985; Brown & Ryan, 2003). Even though few studies have been carried out on the effects of mindfulness in AD, there is evidence of the positive effect of mindfulness on adults' attention, memory, executive function and general cognition (Berk, van Boxtel, & van Os, 2017; Gard, Holz, & Lazar, 2014; Larouche, Chouinard, Goulet, &

Hudon, 2016). In a longitudinal study, Quintana-Hernández et al. (2015), found that mindfulness practices significantly benefited participants diagnosed with mild-moderate AD, since they maintained their cognitive abilities preserved for two years. By delaying cognitive decline, mindfulness showed to have a significant positive impact on the clinical course of AD. In a recent review, Berk, Warmenhoven, van Os, and van Boxtel (2018) analyzed the efficacy of the two most common mindfulness-based interventions (stress reduction and cognitive therapy) with people with dementia and found improvements in attention, memory, cognition, depressive and anxiety symptoms, QoL and well-being. In another review, Russell-Williams et al. (2018) focused on the benefits of mindfulness and meditation on patients with AD, dementia, mild cognitive impairment and subjective cognitive decline. Results indicated a reduction of cognitive decline and perceived stress, as well as improvements in the participants' QoL, functional connectivity, volume brain change and cerebral blood flow. Mindfulness skills may also inhibit negative thoughts, feelings and sensations that arise in the flow of consciousness, reducing depression and anxiety, which can be used to change the patterns of automatic responses into more purposeful and flexible responses in the general population (Garland, Farb, Goldin, & Fredrickson, 2015; Tang, Holzel, & Posner, 2015), but also in people with mild cognitive impairment (Larouche et al., 2016). Overall, the available preliminary evidence on mindfulness and dementia points to a positive association between mindfulness practices and QoL (Berk et al., 2018; Khalsa, 2015; Larouche et al., 2016; Paller et al., 2015; Russell-Williams et al., 2018). However, the mediator role of mindfulness on QoL, in mild AD patients, has not been studied.

Spirituality represents an important resource for AD patients, which may also contribute to improved QoL (Katsuno, 2003). Although it is a broad and complex construct, defined in many different ways, spirituality is related to purpose and meaning, such as transcendence, faith and hope (Jones, Pryor, Care-Unger, & Simpson, 2018; Sullivan & Beard, 2014). Studies show that patients with mild AD may find in spirituality a resource to meet the challenges of their cognitive loss (Beuscher & Beck, 2008) and an inner meaning to deal with the disease by linking spirituality with a perception of QoL (Katsuno, 2003). Despite the cognitive decline and critical capacity in AD, spirituality is preserved (Dalby, Sperlinger, & Boddington, 2012), and plays an important role in how patients deal with the disease and adjust to the deficits, influencing QoL (Beuscher & Beck, 2008; Katsuno, 2003). Taking in consideration previous evidence on spirituality, one might expect that it may have a mediator role on QoL.

The awareness of the disease is related to the recognition of general cognitive impairment, which includes cognitive deficits, as well as the perception of the impact of the disease on daily activities (Dourado et al., 2006). Horning, Melrose, and Sultzer (2014) found that the insights of patients with AD were positive predictors of the onset of anxiety and depression, since it allows a better perception of the awareness of the deficits and the loss of functionality. An impaired insight regarding AD has been associated with better health-related QoL (Hurt et al., 2010; Stites,

Karlawish, Harkins, Rubright, & Wolk, 2017). However, findings regarding AD awareness are not consensual.

The overall cognitive impairment is associated with functional decline (Boyle et al., 2003). In fact, one of the main clinical features of AD is the impairment of daily functioning, which is reflected in the lack of ability to perform basic activities of daily living (BADL) and the early loss of productivity (Marshall et al., 2011). While an inactive lifestyle is reflected in the development and progression of AD, a physically active lifestyle is a preventive measure (Rolland, van Kan, & Vella, 2008). Overall, physical and functional dependence have been associated with worse QoL (Chan, Slaughter, Jones, & Wagg, 2015; Yeaman, Kim, Alexander, Ewing, & Kim, 2013). Progressively compromised functionality in patients with AD results in increased demands for family care (Zidan et al., 2012) and routine changes for all family members requiring an adjustment to the new condition of having a family member with AD (Rosland, Heisler, & Piette, 2012). The literature shows a positive association between family satisfaction and patient's QoL (Shippee, Henning-Smith, Gaugler, Held, & Kane, 2017).

Depression often occurs in AD associated with other psychological comorbidities such as anxiety, irritability and apathy, and may represent a psychological response to cognitive decline (Korczyński & Halperin, 2009). Other studies suggest that depression and anxiety are responsible for the loss of the capacity to perform daily living activities (ADLs), the rapid worsening of cognitive decline and decreased QoL, in AD (Winter, Korchounov, Zhukova, & Bertschi, 2011).

A reduced perception of social support is also reflected in the patient's QoL (Ahmed-Mohamed, Fernandez-Mayoralas, Rolo-Perez, Forjaz, & Martinez-Martin, 2013). Thus, the promotion of relationships like friendship and emotional support contribute to lower the loss of cognitive abilities and a better QoL in patients with AD (Logsdon et al., 2010). Less social support results in lower perception of the patient's health status, which in turn has a direct impact on QoL (Ahmed-Mohamed, Fernandez-Mayoralas, Rojo-Perez, Forjaz, & Martinez-Martin, 2013).

According to Livneh and Antonak (2005), there are several factors that influence patient's QoL during the process of psychological adaptation to a chronic illness and disability: factors related to the disease, as the type of disease and the resulting functional impairment (Livneh, 2001); emotional reactions that may arise at the onset of the disease, as the sense of loss, anxiety, denial and depression (Livneh & Antonak, 2005); contextual factors related to the disease, such as personality, social support and family issues, that may act as predictors, mediators or moderators of the patients' emotional reactions and QoL (Livneh, 2001). Based on the Livneh and Antonak's theoretical framework, this study analyzed how psychological reactions (psychological morbidity) and contextual variables (mindfulness, spirituality, awareness of the disease, functionality, social support and family satisfaction) contributed to QoL (outcome) in patients with mild AD. Psychological reactions and contextual variables were expected to have a direct effect on the QoL, and mindfulness and spirituality, as personal resources to cope with AD, were expected to mediate the relationship between all psychosocial variables and QoL.

## Method

### Participants and procedure

In this study, 128 patients with mild AD were recruited from four Hospitals from the North of Portugal. Patients' criteria for probable AD were assigned by the neurologist, according to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) and the National Institute of Neurological and Communicative Disorders and Stroke/Alzheimer's Disease and Related Disorders Association (NINCDS/ADRDA) criteria. Patients were defined as having a mild AD, if they scored 1 on the Clinical Dementia Rating Scale. Exclusion criteria included having severe psychiatric disorders or cerebral vascular diseases. After being referred by their physicians, patients were addressed by a researcher who presented the study and informed about its objectives, and subsequently invited them to participate on a voluntary basis. All patients that accepted to take part in the study signed an informed consent and answered the instruments in an interview format to ensure that all questions were answered and understood. After completing the questionnaires, caregivers were requested to confirm the patients' answers to the Assessment Scale of Psychosocial Impact of the Diagnosis of Dementia (ASPID). To ensure the sample homogeneity regarding cognitive impairment, patients also answered the Montreal Cognitive Assessment (MoCA) and the Mini-Mental State Exam (MMSE) questionnaires. The study protocol was approved by the local Hospital's Ethics Committee, and carried out in accordance with the Declaration of Helsinki.

### Measures

*Cognitive and Affective Mindfulness Scale-Revised* (CAMS-R; Kumar, Feldman, & Hayes, 2007; Portuguese version of Teixeira, Ferreira, & Pereira, 2017) includes 10 items that assess the regulation of attention, orientation to the experience of the present without judgments and conditioned response patterns. The CAMS-R contains questions like "I am able to accept the thoughts and feelings I have" and "I am able to focus on the present moment". Items are rated on a 4-point Likert scale from 1 ("not at all") to 4 ("almost always"). A high score indicates greater use of strategy and quality of mindfulness. In this study, the Cronbach's Cronbach alpha was .83.

*Assessment Scale of Psychosocial Impact of the Diagnosis of Dementia* (ASPID; Dourado et al., 2014; Portuguese version of Pereira & Lima, 2015) is an instrument that assesses awareness of the disease in Alzheimer's dementia. The original version consists of 26 items distributed by four subscales: a) awareness of cognitive functions and health status, b) awareness of the ADL's, c) emotional awareness and d) awareness of social status and relationships, and provides also a global score. The Portuguese version includes 16 items with higher scores indicating higher awareness. The questionnaire is composed of items such as: "Has the disease changed your disposition to meet people?" or "Do you think you are sadder than before?". The alpha for the full scale, in this study, was .70.

*Hospital Anxiety and Depression Scales* (HADS; Zigmond & Snaith, 1983; Portuguese version of Pais Ribeiro et al., 2007) evaluates psychological morbidity in community and

clinical contexts, consisting of two subscales (depression and anxiety). It comprises 14 items (7 items in the depression scale and 7 items in the anxiety scale) on a Likert scale ranging between 0 and 3. Items like "I still enjoy the things I used to enjoy" or "I can sit at ease and feel relaxed" are some examples of the scale's questions. The overall result of each subscale range from 0 to 21, and from 0 to 2, for the total scale. Only the full scale was used with higher scores indicating more emotional distress or psychological morbidity. In this study, the Cronbach's alpha in the anxiety subscale was .72, in the depression subscale was .78 and in the overall scale was .84.

*Satisfaction with Social Support Scale* (SSSS; Pais Ribeiro, 1999) assesses satisfaction with social support, consists of 15 items, on a Likert scale of 1 to 5, which result in four dimensions: Satisfaction with friends/acquaintances (SA); Intimacy (IN); Satisfaction with family (SF) and social activities (AS). The SSSS addresses questions like "I don't go out with friends as much as I would like" and "I am satisfied with the way I relate with my family". The score for the overall scale ranges between 15 and 75. A high score indicates greater perception of satisfaction with social support. The full Cronbach's alpha in the sample was .88. A high score indicates greater social support.

*Family Satisfaction Scale* (FSS; Olson, Gorall, & Tiesel, 2004; Portuguese version of Rebelo, 2008) is a scale with 10 items that assess the degree of satisfaction of family members and the degree of closeness between them (e.g. satisfaction with: "The degree of closeness between family members"; "The way problems are discussed"). The degree of satisfaction is expressed on a Likert 5-point scale, ranging from "very dissatisfied" to "very satisfied". The score for the overall scale ranges between 0 and 30, with a higher score indicating more family satisfaction and increased happiness. In this study, the alpha was .93.

*The Spiritual and Religious Attitudes in Dealing with Illness* (SpREUK; Büssing, Ostermann, & Matthiessen, 2004; Portuguese version of Pereira, Vilaça, Pedras, Vieira, & Lima, 2019) is an instrument that consists of 15 items that assess how spirituality helps dealing with the chronic disease, rated on a Likert scale from 0 to 4. SpREUK contains questions like "I am searching for an access to spirituality/religiosity" and "My illness is a chance for my own development". The score for the overall scale ranges between 0 and 60. A higher score indicates higher spirituality. In this study, the alpha was .95.

*The Index of Barthel* (Mahoney & Barthel, 1965; Portuguese version of Araújo, Ribeiro, Oliveira, & Pinto, 2007) assesses the degree of functionality, and focuses on physical disability in ten domains (feeding, bathing, grooming, dressing, bowel and bladder control, toilet use, transfers from bed to chair and back, mobility on level surfaces and stairs). According to the Portuguese adapted version, the cutoff score is 60, with scores above 60 indicating greater functionality. The score for the overall scale ranges between 0 and 100. The alpha in this sample was .81.

*Quality of Life-Alzheimer's Disease* (QoL-AD; Logsdon, Gibbons, McCurry, & Teri, 2002; Portuguese version of Bárrios et al., 2013) assesses the QoL in patients with Alzheimer's dementia, reported by the patient and caregiver. It consists of 13 items, rated on a Likert scale of 1 to 4, addressing the following dimensions: physical health,

energy, humor, living conditions, memory, family, marriage, home ownership, ability to do domestic tasks, engaging in activities that provide pleasure, money, and general life. Questions like “How do you feel about your energy level?” or “How has your mood been lately?” are included in the QoL-AD. The overall results range from 13 to 52, and higher scores indicate better QoL. In this study, the alpha was .88.

### Data analysis

To analyze the relationships between all variables with QoL, a Pearson correlation was performed. In order to obtain direct and indirect effects between the variables and an indication of the overall model, a path analysis was conducted with bootstrapping. The model was assessed using chi-square and relative chi-square, goodness-of-fit statistic (GFI), comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error approximate (RMSEA). Adequate fit was defined as chi-square p-value over .05, relative chi-square below 2, GFI and CFI over .95, SRMR below .08, and RMSEA below .07 (Hooper, Coughlan, & Mullen, 2008). Standardized beta coefficients ( $\beta$ ) were derived for each explanatory variable in order to allow the relative importance of each measure. All standard statistical analyses were done using the SPSS software (version 24.0) while path analyses were performed with the AMOS software (version 24.0).

**Table 1.** Sociodemographic characteristics.

Variables	Descriptive statistics	
	<i>n</i>	%
Age		
< 70 years	20	15.6
Between 70 and 80 years	62	48.4
More than 80 years	46	35.9
Mean (SD)	76.1 (6.9)	
Gender		
Female	84	65.6
Man	44	34.4
Civil Status		
Married	81	63.3
Widow	40	31.3
Single/Divorced	7	4.7
Habitation		
Urban	85	66.4
Rural	43	33.6
Education Level		
Illiterate		19.5
1–4 years		70.3
5–9 years		7
10–12 years		2.3
>12 years		0–8

**Table 2.** Descriptive statistics and Pearson correlation coefficients.

Variables	Descriptive Statistics <i>M (SD)</i>	Pearson Correlation Coefficients						
		(2)	(3)	(4)	(5)	(6)	(7)	(8)
Psychological morbidity	(1) 17.0 (7.0)	–.188*	–.346***	–.324***	–.297**	–.267**	.110	–.447***
Functionality	(2) 102.4 (7.5)		.076	.132	.139	.322***	–.040	.401***
Awareness of disease	(3) 23.2 (4.1)			.230**	.347***	.416***	–.221*	.291**
Family satisfaction	(4) 35.9 (6.1)				.557***	.314***	–.073	.476***
Social support	(5) 63.8 (8.8)					.288**	–.145	.444***
Mindfulness	(6) 23.9 (4.0)						–.240**	.370***
Spirituality	(7) 30.6 (14.3)							–.250**
Quality of life	(8) 34.1 (5.3)							

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## Results

### Sample characteristics

The sample included 128 patients with mild AD, with a mean age of 76 years ( $SD = 6.92$ ). Of the total sample, 65.6% were female, 63.3% were married, 66.4% lived in an urban region, and 70.3% showed a low level of education (primary education). All patients were taking anti-cholinesterase inhibitors. Table 1 presents the sociodemographic characteristics of the sample.

### Relationships among psychological variables

The results showed a positive correlation between mindfulness ( $r = .370$ ,  $p < .001$ ), social support ( $r = .444$ ,  $p < .001$ ), family satisfaction ( $r = .476$ ,  $p < .001$ ), awareness of disease ( $r = .291$ ,  $p < .01$ ), functionality ( $r = .401$ ,  $p < .001$ ) and QoL. A negative correlation between psychological morbidity ( $r = -.447$ ,  $p < .001$ ), spirituality ( $r = -.250$ ,  $p < .01$ ) and QoL was found (Table 2).

### Mediation model

In order to analyze the mediator effect of mindfulness and spirituality on the relationship between psychological morbidity, functionality, awareness of the disease, family satisfaction, social support and QoL, the hypothesized model was tested. The multivariate linear regression final model for the mediation (Figure 1) showed a good global fit:  $\chi^2_{(13)} = 12.4$  ( $p = .492$ );  $\chi^2/df = .957$ ; GFI = .937; CFI = 1.000; SRMR = .069; RMSEA = .000; P (RMSEA < .05) = .748. The final model showed that psychological morbidity ( $\beta = -.251$ ;  $p < .001$ ) and social support ( $\beta = .171$ ;  $p < .05$ ) had only a direct effect on QoL. Otherwise, functionality ( $\beta = .302$ ;  $p < .001$ ) and family satisfaction ( $\beta = .264$ ;  $p < .001$ ) had a direct effect on the QoL and an indirect effect mediated by mindfulness and spirituality (respectively,  $\beta = .010$ ,  $p < .05$  and  $\beta = .007$ ,  $p < .05$ ) (Table 3). Finally, awareness of the disease had only an indirect effect on QoL mediated by mindfulness and spirituality ( $\beta = .012$ ;  $p < .05$ ) (Table 3).

The hypothesized model was also tested without spirituality as a mediator variable (only mindfulness), with the results indicating that the model maintained their global fit:  $\chi^2_{(9)} = 6.948$  ( $p = .643$ );  $\chi^2/df = .772$ ; GFI = .985; CFI = 1.000; SRMR = .071; RMSEA = .000; P (RMSEA < .05) = .818.

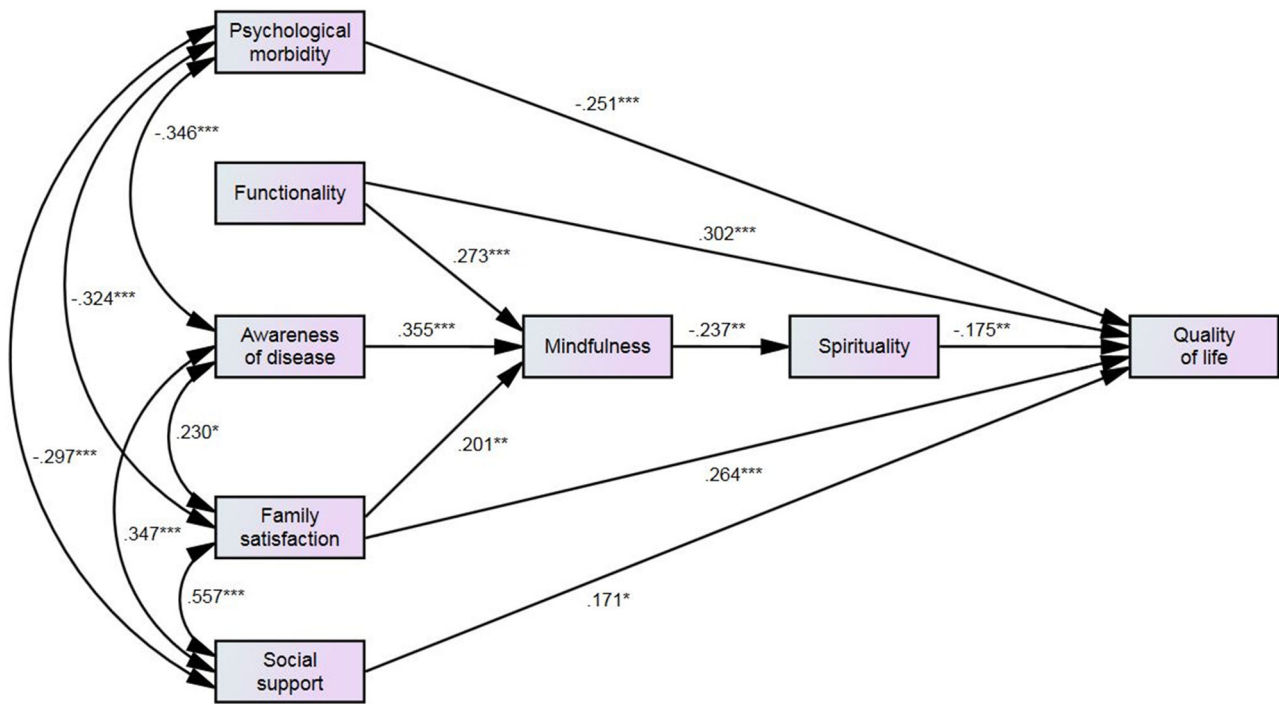


Figure 1. Path Analysis with Standardized Direct Effects and Correlations. CI<sub>95%</sub> = Bias-Corrected Bootstrap Confidence Interval at 95% (1000 Samples).

Table 3. Standardized indirect effects for the mediation.

Predictor	Mediator	Outcome	$\beta$	CI	
Functionality	Mindfulness	Spirituality	-.058 *	-.153	-.002
Awareness of the disease	Mindfulness	Spirituality	-.071 **	-.141	-.016
Family satisfaction	Mindfulness	Spirituality	-.039 *	-.096	-.008
Mindfulness	Spirituality	Quality of life	.036 *	.004	.090
Functionality	MIN + SPR	Quality of life	.010 *	.001	.041
Awareness of the disease	MIN + SPR	Quality of life	.012 *	.001	.035
Family satisfaction	MIN + SPR	Quality of life	.007 *	.001	.024

Note. \* $p < .05$ . \*\* $p < .01$ . CI = 95% confidence interval (lower and upper); MIN = Mindfulness; SPR = Spirituality.

## Discussion

The goal of this study was to analyze the relationship between psychological morbidity, awareness of the disease, functionality, social support, family satisfaction, mindfulness, spirituality and QoL, in patients with mild AD. The results showed that psychological morbidity had a negative direct effect on QoL, which is in accordance with the literature. Neuropsychiatric and behavioral symptoms can be conceptualized as a disease process (Li et al., 2014) which, besides being predictors of QoL, also predict the increase and progression of AD, thus explaining the lower QoL (Li et al., 2014). Patients' social support has also shown to have a positive direct effect on QoL, as supported by previous studies. For instance, Logsdon and colleagues (2010) found that social support groups for patients with dementia that favored interpersonal relationships, socialization and promotion of emotional support, in addition to lessening the decline of cognitive abilities and psychological morbidity, improved the QoL of patients with AD.

Psychological morbidity and social support, exogenous variables in this model, were associated, with higher social support contributing to less psychological morbidity. This finding is consistent with the literature because it suggests that social support contributes to the reduction of depression and anxiety, as well as to the QoL and life satisfaction's improvement in these patients (Leung, Orrell, & Orgeta, 2015; Logsdon et al., 2010). The results also

showed that less psychological morbidity was associated with greater awareness of the disease. However, Horning et al. (2014) found that psychological morbidity was associated with greater patient's awareness of functional and cognitive losses. The fact that the participants of this study were patients with mild AD, with more preserved insight of the disease, may explain the findings. Psychological morbidity revealed to be negatively associated with family satisfaction. In fact, positive family communication is considered a facilitator of family functioning (Segrin & Flora, 2005) and lower family satisfaction occurs mainly in families who are critical, controlling, overprotective and conflictual making it difficult for patients to adapt to their chronic illness (Rosland et al., 2012). High levels of anxiety and depression in families with mild AD patients may arise as a result of changes in family dynamics (Li et al., 2014). Therefore, it makes sense that patients that receive support and are satisfied with the support provided by their family, experience more emotional security and less psychological morbidity.

Social support was positively associated with awareness of the disease and family satisfaction. A good network of social support may allow the patient to be more aware of the difficulties and limitations that arise in a gradual manner. Family social support in monitoring the consultations, supervision, and some ADLs may contribute to patients' greater family satisfaction (Bellin et al., 2013), which may explain the positive association between this variable and

awareness of the disease. As expected, social support and family satisfaction had a direct positive effect on QoL (Ahmed-Mohamed et al., 2013; Bellin et al., 2013).

The impairment of daily functioning, reflected in the ability to perform BADLs and the early loss of productivity, is one of the clinical features of mild AD (Marshall et al., 2011). As the disease progresses, some aspects of the consciousness of these patients with mild AD are compromised and, although the patient often tries to hide the losses and cognitive limitations, justifying them with normal aging, they have a significant impact on the patient's day-to-day life. In this study, results showed that not only functional abilities directly affect QoL, but also that this relationship was mediated by mindfulness. Mindfulness allows the patient to focus on the present, without judgment, openly, allowing better self-awareness (Shapiro, Carlson, Astin, & Freedman, 2006). Awareness of the disease is related to the ability to realize the patient's condition, avoiding irrational beliefs about the disease (Dourado et al., 2006). Considering that mindfulness meditation enables patients with greater awareness of the impact of the disease with a focus on physical disabilities and cognitive functioning, as well as a better management of the negative thoughts, feelings and sensations that may arise, the mediator role of mindfulness in the relationship between functionality/awareness of the disease and QoL was predictable.

Mindfulness was also a mediator between family satisfaction and QoL, which may be explained by the fact that mindfulness may reduce stress in the patient and impact the family by helping communication among family members contributing to family satisfaction (Gambrel & Keeling, 2010).

Spirituality has a significant impact on health and includes cognitive aspects such as the search for meaning and purpose in life, as well as emotional aspects such as hope and support. The feeling of vulnerability and the loss of control can lead the AD patient to consider spirituality as a resource to deal with the disease, working as a coping strategy that impacts QoL (Katsuno, 2003). Spirituality may allow the patient with AD to feel more confident and hopeful, supporting the maintenance of the identity and the preservation of self (Sullivan & Beard, 2014). In the family system, where there is interdependence between family members, spirituality may enable greater interaction and sharing of anguish, uncertainty and stress associated with the disease, contributing to a greater psychological well-being (Kim, Reed, Hayward, Kang, & Koeing, 2011). According to Carmody, Reed, Kristeller, and Merriam (2008), mindfulness may facilitate the development of spirituality and the reduction of physical and psychological symptoms.

Interestingly, mindfulness showed a negative association with spirituality, while spirituality contributed negatively to QoL and mediated the relationship between mindfulness and QoL. Spirituality may help patients to cope with the disease and find a meaning in life as the disease progresses, being therefore more centered in the future. Mindfulness is focused on the present moment, without judgments (Brown & Ryan, 2003), reinforcing the importance of experiencing the present reality towards symptom control and attitudes. Moreover, mindfulness presented a positive relationship with QoL. Despite the associations between spirituality, mindfulness and QoL, highlighted by

the literature, suggesting that spirituality and mindfulness have a positive impact on QoL (Carmody et al., 2008), one may hypothesize that patients may turn more efficiently to spirituality in more advanced stages of AD, when their QoL is significantly worse, in order to find a meaning for the disease and a resource to adjust to loss of functionality. In fact, the hypothesized model tested without spirituality was still significant and fit the data showing that mindfulness alone explained the mediating effect between functionality, awareness of the disease, family satisfaction and QoL. In this sense, one may also speculate that while mindfulness may be an essential resource for AD patients regardless of the disease stage, mild AD patients may resort to spirituality as a resource in more advanced stages of the disease. However, future studies are needed to test this hypothesis.

Although several studies have shown positive associations between mindfulness and spirituality (Carmody et al., 2008; Greeson et al., 2015), as well as the mediator role of spirituality between stress and mental health (Reutter & Bigatti, 2014), there is still a shortage of studies regarding the mediating role of spirituality between mindfulness and QoL. The findings of this study are not in accordance with the literature that showed a positive association between mindfulness and the perception of the transcendent or spirituality (Shapiro et al., 2006), whereas mindfulness was associated with increased spirituality and QoL (Carmody et al., 2008; Greeson et al., 2015). Analysis of this finding should take into consideration the possible limitations of the used measures to cover complex and subjective constructs such as spirituality and mindfulness. Again, more studies are warranted in this area with mild AD patients. Finally, it is interesting to realize that since this study did not include a mindfulness training program, participants' mindfulness skills were possibly developed before the AD diagnosis, suggesting a positive impact on QoL, and a significant mediator role between functionality, awareness of disease, family satisfaction and QoL. Overall, results highlight the importance of mindfulness training in people with mild AD, preferably before the AD onset, suggesting the importance to teach mindfulness as a new skill, in patients struggling with progressive cognitive deficits.

### **Limitations and future research**

The cross-sectional design of the study limits the interpretation of the presented results. A prospective study would further clarify the relationship between the psychological variables and QoL, as the AD progresses. In addition, future studies should include mindfulness skill's interventions in order to test their effectiveness and better understand their impact on patients' QoL.

### **Conclusions**

This study reveals the mediating role of mindfulness and spirituality in the relationship between functionality, awareness of the disease, family satisfaction and QoL. Unlike mindfulness, spirituality showed to negatively impact QoL of patients with mild AD, suggesting that this coping mechanism may be less significant than mindfulness at this stage of the illness.

The results showed the importance of developing interventions directed at patients with mild AD focused on the promotion of mindfulness skills, in addition to the promotion of functionality, awareness of the disease, family satisfaction, social support, and the reduction of psychological morbidity. Considering the relevance of mindfulness to QoL, in the early stage of AD, intervention programs aimed at the promotion of mindfulness skills may be particularly efficacious when implemented before the onset of the disease, in potential AD patients. Finally, since family satisfaction also contributed to mindfulness, interventions should include family members when patients report having difficulties with their family.

## Disclosure statement

The authors declare that they have no conflict of interest.

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