Received: 26 December 2017 | Accepted: 25 July 2018
DOI: 10.1002/gps.4965

SPECIAL ISSUE PAPER

WILEY International Journal of Geriatric Psychiatry

Bidirectional relationship between caregiver burden and neuropsychiatric symptoms in patients with Alzheimer's disease: A narrative review

Ahmet Turan Isik[1] | Pinar Soysal[2] | Marco Solmi[3,4] | Nicola Veronese[5,6]

[1] Unit for Aging Brain and Dementia, Department of Geriatric Medicine, Faculty of Medicine, Dokuz Eylul University, Izmir, Turkey

[2] Department of Geriatric Medicine, Faculty of Medicine, Bezmialem Vakif University, Istanbul, Turkey

[3] Department of Neurosciences, University of Padova, Padova, Italy

[4] Centro Neuroscienze Cognitive, University of Padua, Padua, Italy

[5] Geriatrics Unit, Department of Geriatric Care, OrthoGeriatrics and Rehabilitation, E.O. Galliera Hospital, National Relevance and High Specialization Hospital, Genoa, Italy

[6] Neuroscience Institute, Aging Branch, National Research Council, Padova, Italy

Correspondence
N. Veronese, MD, Neuroscience Institute, Aging Branch, National Research Council, Via Giustiniani, 2-35128 Padova, Italy.
Email: ilmannato@gmail.com

Objective: The aim of this review is to make a state of the art of the potential influence of neuropsychiatric symptoms (NPs) on caregiver stress and vice versa.

Methods: We searched PubMed and Google Scholar for potential eligible articles.

Results: Patients with Alzheimer's disease (AD) usually need high levels of care in all activities of daily living, most of them provided by family members, friends, or informal caregivers. Caregivers have to cope with both age-related conditions and dementia-related factors. Therefore, caregiving in dementia is more difficult and stressful than caregiving for older adults, affected by other conditions. Neuropsychiatric symptoms, such as anxiety, agitation, disinhibition, aggressive behavior, and sleep disturbances are more closely related to caregiver burden, and associated with more negative outcomes such as decline in their general health, quality of life, and social isolation. Caregiver burden worsens relationship between caregiver and patients with AD. Thus, this relationship may increase the frequency and severity of NPs. Predictors of burden were being a woman, a spouse, and old person with immature coping mechanisms, social isolation, with insufficient knowledge about dementia, poor premorbid relationship with patient, and high levels of negative expressed emotions.

Conclusion: Because of the bidirectional relationship between caregiver burden and NPs, the active management strategies of dementia care should include early identification and treatment risk factors for both caregiver stress and NPs in patients with AD. Therefore, to improve one of them can be exert beneficial for the other.

KEYWORDS

Alzheimer's disease, caregiver burden, neuropsychiatric symptoms

1 | INTRODUCTION

It was estimated that 35.6 million people lived with dementia worldwide, with numbers expected to almost double every 20 years, to 65.7 million in 2030 and 115.4 million in 2050.[1] As the global population ages, not only patients with dementia but also their caregivers and caregiver-related problems increase, because people with dementia, a majority of whom live in community,[2] usually need high levels of care in all activities of daily living, most of which is provided by family members, friends, or informal caregivers.[3,4] It was reported that these caregivers spent an estimated 18.2 billion hours for informal (unpaid) assistance, and thus, they provided a contribution nearly at $230.1 billion in 2016 in the United States.[5] This was approximately 8 times the total revenue of McDonald's in 2013 ($ 28.1 billion).[6] However, caregiving in dementia is more difficult and stressful than caregiving for older adults such without dementia as physically impaired patients,[7] because caregivers have to cope with dementia related factors, including cognitive impairment, dependence on activities of daily-living, and behavioral and psychological symptoms; hence, all these factors can lead to caregiver burden in course of time.[8] Previous studies found that neuropsychiatric symptoms (NPs) are more closely related to caregiver burden than other symptoms, such as deteriorated cognitive function or limitations in the activities of daily-living[8,9] and caregivers who experience NPs are more vulnerable.[10]

Caregiver burden is associated with negative outcomes for both caregivers and patients with dementia such as decline in their general health, decreased quality of life, and increased risk for morbidities.[10,11] Furthermore, despite the lack of disease modifying therapies for Alzheimer's disease (AD), studies have consistently shown that active management of AD and other dementias can improve quality of life for patients with dementia and their caregivers.[12-14] Therefore, the active management strategies should include identification and treatment of risk factors for caregiver stress, and a coordination of care among physicians.[6] This review is aimed to focus on bidirectional relationship between caregiver burden and NPs in patients with AD and to raise awareness about this issue. This bidirectional relationship is summarized in Figure 1.

2 | WHAT IS CAREGIVER BURDEN?

Caregiver burden is a multidimensional response to physical, psychological, social, and financial stressors associated with the caregiving experience.[15] Although patients with AD care are similar to the care of people with other conditions, dementia caregivers have to support more extensive assistance.[16] More than half of AD caregivers have tasks about helping activities of daily livings such as using the telephone, helping the person take medications correctly, bathing, using the toilet, and managing incontinence.[6,16] Therefore, caregivers of the patients with AD have to spend time more hours of help than caregivers of the older patients with other comorbidities.[16] However, the patients with AD often cannot understand why the care has to be provided, and thus, they may refuse it.[17] Furthermore, patients with AD might also be likely to suffer from other age-related comorbidities that increase throughout the aging process.[18-20] Thus, care becomes more complicated, and it results in increase disability, hospitalizations, and premature institutionalization. On the other hand, as defined in the models of cognitive frailty, reversible cognitive and functional damages that can be caused by a number of factors associated with aging, including vascular diseases, sarcopenia, increased inflammation, metabolic and hormonal changes, and psychosocial factors may accelerate progression of dementia.[21-23] Interventions, such as drug treatment for chronic diseases, physical activity, fall prevention, and nutritional support, which target physical, nutritional, cognitive, and psychological domains, may delay the progression and secondary occurrence of cognitive frailty-related adverse outcomes.[24] Therefore, it is important for caregivers to start supporting their patients for a secondary prevention (lifestyle) of cognitive and functional impairment, which may increase caregiver burden, as well as deal with cognitive and noncognitive symptoms of dementia.[21,24] Another problem is that caregivers often have to serve their caregiving role for many years due to the fact that AD last on for longer periods of time as the average 8 years, and it has a progression despite of the treatment.[7,17,25] As a result of these factors, during the performing all these tasks for patients with AD, the caregivers often describe the experience as “enduring stress and frustration.”

Key points

- Neuropsychiatric symptoms (NPs), such as anxiety, agitation, disinhibition, aggressive behavior, and sleep disturbances are more closely related to caregiver burden than other symptoms.
- Caregiver burden is associated with negative outcomes for both caregivers and patients with Alzheimer's disease.
- Caregiver burden may increase the frequency and severity of NPs.
- The active management strategies of dementia care should include identification and treatment risk factors for both caregiver burden and NPs in patients with AD.

3 | FACTORS INFLUENCING CAREGIVER BURDEN

There are a number of studies investigating risk factors for caregiver burden. One of them has demonstrated that functional impairment in instrumental daily living activities could be linked to higher burden.[26] A study by Myonghwa Park et al, including 10 399 patients with dementia, showed that while the number of comorbidities, perceived health status, coresidence, caregiving hours, and contact frequency were more likely to raise the burden score, the presence of secondary caregiver and economic activity lead to lowered caregiver burden scores.[27] However, it was found that NPs and functional dependencies were the largest contributors to caregiver burden.[27] Although NPs are clearly the major contributors to caregiver burden, there are many caregiver's characteristics that can be predictors or protective factors of this burden.[11,28-32] In particular, being a woman, a spouse, and old person with immature coping mechanisms, having less support from family or friends, insufficient knowledge about dementia, poor premorbid relationship with patient, and high levels of negative expressed emotions are predictors of burden.[11,28-32]. Contrary to them, having an informal supports (eg, friends and neighbors) and having information about dementia, mature coping skills are protective factors.[11,28-32] In addition to aforementioned factors, cultural, ethnic, and racial differences can also affect the development of caregiver burden.[11,28,33-35] All these risk factors are summarized in Figure 1.

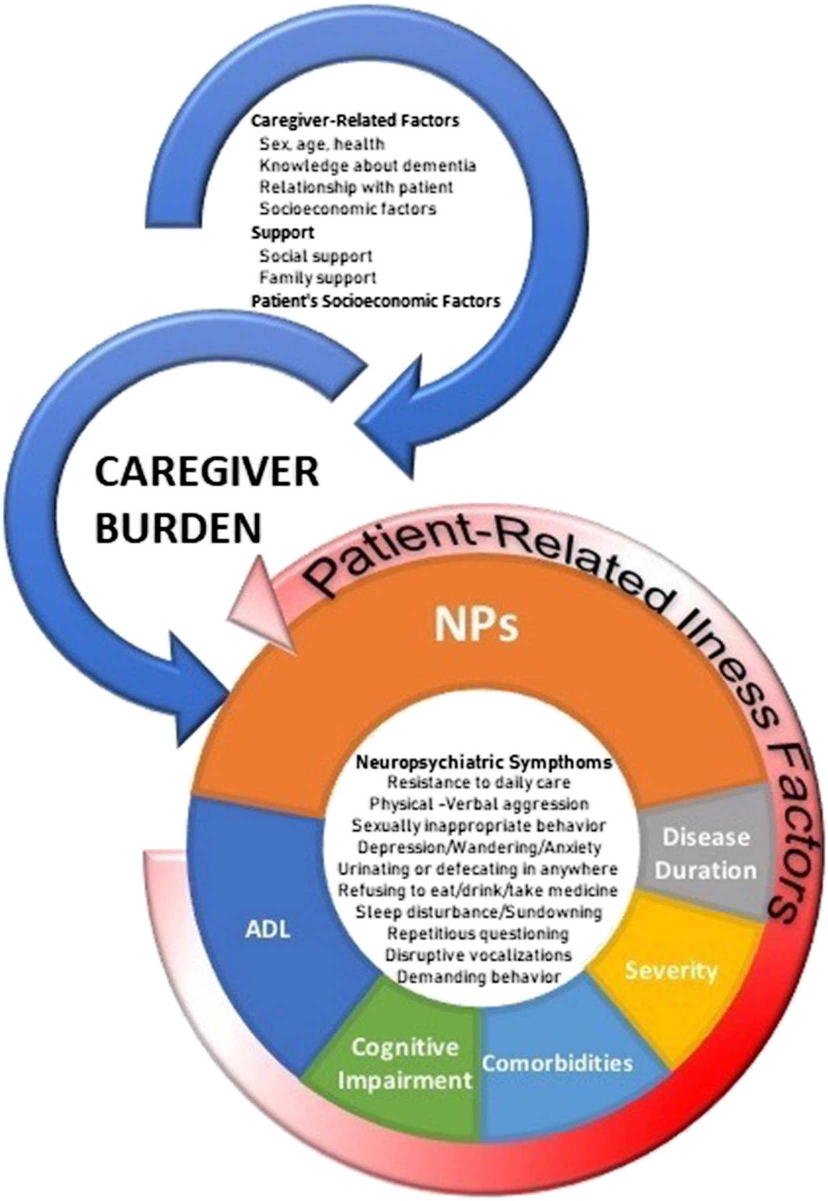

FIGURE 1 Bidirectional relationship between caregiver burden and neuropsychiatric symptoms in patients with Alzheimer's disease [Colour figure can be viewed at wileyonlinelibrary.com]

4 | EFFECTS OF NEUROPSYCHIATRIC SYMPTOMS OF DEMENTIA ON CAREGIVER BURDEN

Patients with AD often present with NPs that often occur as a result of deterioration in mood, thought, perception, and behavior.[36] One or more of NPs can affect approximately the 97% of patients during the course of the disease[37] and pave the way for cognitive and functional worsening, long-term hospitalization, mortality, and decreased quality of life for caregivers and patients.[37] When these negative outcomes are considered, it is clear that prevention or treatment of NPs is very important for both patients with dementia and their caregivers.

A recent longitudinal study demonstrated that coexisting decrease and increase in cognitive function and functional impairment, respectively, and the presence of NPs over time in patients with cognitive decline were independently associated with increased caregiver burden.[38] Another study reported that caregiver burden slightly increased during the 3 years of follow-up and that NPs and functional impairment of patients with probable AD linked to caregiver burden.[39] A study by Aguëra-Ortiz et al found that caregiver burden for caregivers of patients with moderate-to-severe AD was reduced during follow-up, due to the fact that NPs, the most important factor related to caregiver burden compared with functional or cognitive decline, decreased in late stage.

NPs can be identified as different neurobehavioral clusters consisting of 2 or more behavioral and psychological symptoms of dementia, including "psychosis," which comprises delusions and hallucinations; the "affective" cluster, which includes symptoms as apathy, depression, and anxiety; and the "hyperactivity" cluster composed of agitation, irritability, disinhibition, and aberrant motor behavior.[36,40] All these symptoms can occur from early to last stages of AD.[37,41,42] One study found that as cognitive impairment progressed, physical aggression, wandering, and agitation increased and delusions declined.[42] Another study found that wandering, sundowning, verbal outbursts, threats, and agitation increased during 14 years in AD.[41]

When the patients lose verbal ability or mobilization in the later stages, NPs might tend to decrease.[42] Neuropsychiatric symptoms that are unpredictable, disruptive, difficult to manage, potentially embarrassing or abusive, and sleep depriving affect on both patients and caregivers.[43,44] Neuropsychiatric symptoms are associated with a faster decline in functionality and cognitive functions in patients with AD.[44] Besides, current evidences have demonstrated NPs to be a major source of stress for the family caregivers, in comparison with other care indications such as the functional impairments or cognitive deficits of the patients.[1,43,45]

Although NPs are highly problematic for caregivers, it is unknown clearly which NPs or symptom clusters have the greatest negative impact on the caregiver.[43] Recent studies demonstrated that depressive behaviors were the “most important symptoms” relative to caregiver burden followed by agitation, aggression, sleep disturbances, apathy, and repetitive behavior while euphoria was the least distressing.[46-49] However, in general, while it is clear that NPs are associated with negative caregiver outcomes, it is difficult to say that only one of these NP clusters is responsible for distress of the caregiver, but the frequency and severity of the NPs is an important predictive factor.[50-52] On the other hand, different symptoms' clusters may have different effects on caregivers.

For example, *aggressive and agitated behaviors*, including physical and psychological violence, cannot be easily accepted by caregivers and make the caregiver fearful, due to the fact that such behaviors usually are not attributed to dementia and are misinterpreted as premorbid personality or poor premorbid relationship with them, and thus, a majority of caregivers believe that symptoms of the disease are under the patients'control.[26,53] Lima Silva et al demonstrated that anxiety and depression lead to highest distress among caregivers of AD patients.[54]

Paranoid or delusional NPs such as accusing the caregiver of being theft and infidelity may lead to disturb the caregiver who may take the behaviors personally.[55] A recent study, including 445 patients with AD, has established that the presence of both delusions and hallucinations associated with greater caregiver burden compared with patients without psychotic symptoms during 3 years.[56] Delusional NPs are a source of serious distress for patients and can result in increased agitation, aggression, wandering, insomnia, and distress. These symptoms are frequently frightening for the caregivers.[57] For example, delusional jealousy is a known risk factor for violence, and it can often be for caregivers.[57,58] Therefore, delusions such as grandiose, somatic, persecutory (especially stealing and threats of bodily harm) and religious delusions, and beliefs about spousal infidelity or abandonment are considered to be a major factor in increasing burden.[57,59]

Depressive symptoms and apathy, which are highly prevalent among patients with AD with estimates ranging up to 40%, may be predictors of caregiver depression as these depressive symptoms suggest to the caregiver that the patient suffers from something.[36,46] A study by Godinho et al, including 60 patients with AD and their caregivers, showed apathy to be responsible for the highest distress level, followed by agitation and aggression.[60] Another study indicated that while depression was the most effective factor on burden in Brazil, apathy was the most common cause to develop caregiver burden in Spain.[61] However, Allegri et al found that contrary to other papers, there was no correlation between negative NPs (depression and apathy) and caregiver burden.[62]

One of the other important NPs is *aberrant motor behavior* that was demonstrated to be the most frequently recorded behavior in AD and strongly associated with caregiver distress.[63] In a study by Matsumoto et al, it was reported that in older patients with AD exhibiting NPs, aberrant motor behavior had the highest mean NPI score and depression/dysphoria had the lowest.[45]

In addition, *sleep disturbances*, including a daytime sleepiness, nocturnal awakenings, nocturnal wandering, and longer sleep onset latency, were a significant source of caregiver burden, and which results in caregiver's own cumulative sleep loss, decreased quality of life and providing care become difficult.[64] Nearly one third of caregivers had a “high disturbance” score, indicating that patients' sleep/nighttime behavior disorder was a source of significant caregiver burden.[65] It was determined that early morning awakenings were the most common sleep problems but were the least disturbing behaviors for caregivers, while night-time awakenings were less common but were most disturbing.[65] Tractenberg et al found that daytime napping was common in patients with AD but lead to lowest burden rating.[66] These results suggest that caregiver burden can vary related to the type of sleep abnormality.

There are a small number of studies about *disinhibition*, and most of them were conducted in frontotemporal dementia.[43] However, disinhibition is also characterized by early and more serious behavioral and personality changes related to frontal systems in patients with AD. The nature of this disruptive behavior is likely exacerbated by impairments in insight and empathy.[43] Higher distress scores were strongly associated with disinhibition in the frontotemporal dementia group compared with AD.[67] One of the most common type of disinhibition is inappropriate sexual behaviors that are very stressful and hard to handle them for caregivers.[68] Fortunately, inappropriate sexual behaviors, the frequency is reported as 3.9% in all the NPs, are not common in the course of AD.[69] Table 1 shows the relationship between caregiver burden and each of NPs. The strategy and selection criteria are presented as Supporting Information 1.

The severity of NPs in patients with AD is generally positively associated with caregiver's stress.[70] However, as a many family caregiver, to be responsible of care for their loved one with AD might be a gladful experience that AD-related caregiver burden might be linked with both psychological and physical morbidity as well as financial problems. Furthermore, when it is taken account that those caring for someone 65 years or older are, on average, 63 years old themselves and caring for a spouse, one third of these caregivers are in fair to poor health themselves[16]; it should be kept in mind that providing care for especially older patients with dementia is a stressful experience that has implications on the caregiver's health (Figure 1).

4.1 | Physical morbidity

Neuropsychiatric symptoms are an important source of stress in patients with AD, and this chronic stress increases both cortisol and norepinephrine-epinephrine by stimulating hypothalamic-pituitary-adrenal axis and sympathetic adrenomedullary axis, respectively.[71] von Känel R et al showed that duration of caregiving and being a caregiver of patient

TABLE 1 Neuropsychiatric symptoms in Alzheimer's disease: Associations with caregiver burden

Neuropsychiatric Symptoms	Study/Studies Associations with Caregiver Burden			
	Strong	Moderate	Weak	Nonsignificant
Delusion	60,53,63,58	70,47	62,54,70	
Hallucination	60,53,58	62	54,70	47
Aggression/agitation	60,53,28,61,47,63	70	54	53
Dysphoria/depression	60,53,61,56		54,70	62,47
Anxiety	60,62,61,56, 63	53,54	54,70	47
Apathy	60,53,28,61	54,47	70	62
Irritability/lability	60,53,61,47	28,54,70		62
Euphoria/elation	60		54,70	62,53,47
Disinhibition	60		62,54,70	53,47
Sleep/nighttime behavior disorder	60,70	62,54,65	70	53
Aberrant motor behavior	60,53,28,47,63	62,54	70	
Appetite/eating problems	60,53,28	62,70	54	

In references 47th and 56th there is no discrimination between strong and moderate associations with CB. The numbers shows the references of paper. It was accepted whether a study has a strong, moderate, or weak association according to the correlational coefficient.

with AD were both associated with chronic low-grade elevated C reactive protein and tumor necrosis factor-α levels.[72] Because of high levels of stress hormones and inflammation, patients with AD are at an increased risk of cardiovascular diseases, especially increased incidence of hypertension, coronary heart disease, and impaired endothelial function of the blood vessels.[6,71,72] Neuropsychiatric symptoms can cause lower immunity, poorer immune response to vaccine, more vulnerable to infectious diseases, slower wound healing, and higher prevalence of chronic conditions, such as diabetes, arthritis, ulcers, and anemia, by the same mechanisms[73]. Additionally, caregiver distress may trigger negative health behaviors, such as poorer self-rated health, sedentary behavior, poor diet and sleep patterns, and greater risk of smoking and drinking alcohol.[73] These possible pathways may contribute to psychological morbidity, worsening physical health and a higher risk of mortality. However, one study showed that spending at least 14 hours per week providing care to predict decreased mortality for the caregiver.[74] Therefore, it is known that dementia caregiving is a complex process, and further studies should be conducted to identify the relationship between NPs and physical morbidity or mortality.

4.2 | Psychological morbidity

The most significant psychiatric outcomes of dementia caregiving are depressive and anxiety symptoms, which were found their prevalence as 34% and 44%, respectively. In one study, it was reported that 62% of caregivers have minor depression and 10% major depression.[17] The major predictors of depression in caregivers include being female, younger age, being the wife of the care recipient, nonblack ethnicity, low education, low income, additional stressful life events, family history of mental health problems, bad relationship between caregiver and care receiver, more hours spent caregiving, social isolation, and dependence in activities of daily living[73-75] NPs, especially aggressive behavior, disinhibition, hallucinations, and the severity of NPs.[52] Another psychiatric condition that is commonly present in caregivers of patient with AD is anxiety. Caregiver anxiety is related to highest correlations to frequencies of patient's anxiety, depression and irritability, hours of care, physical and psychological illness scores, low education, and lack of time for leisure activities.[52]

Caregivers have to cope with NPs that cause a serious stressful, and are usually unable to find solutions. One study found that the perceived social support had have been low for almost half of the caregivers, and only 36% might receive help from others, such as other family members.[76] Moreover, the same study reported that family caregivers of AD patients usually had went to the same pharmacy as the patients (96%), were treated with psychotropic drugs (anxiolytics, antidepressants, sleep aids, etc.) (68%), and had requested relaxing plants from the pharmacy to improve their nervousness, anxiety, and lack of sleep (48%).[76]

Caregiver anxiety and depression are not only clinical but also social problems influenced by the patient's NPs and caregiver characteristics. It should be kept in mind that to detect and treat caregiver psychological health need the multidisciplinary approach and focus on multiple risk factors related to both patient and caregiver.

4.3 | Social isolation

Many caregivers of AD patients become isolated from family members and friends because they do not leave their spouses at home alone, or to go out with them. Furthermore, 35% of AD's caregivers are over age 65, and as these older caregivers are generally have their own physical limitations, they spend almost all of their time in their homes and are more isolated from society.[16] Caregivers of patients with AD give up their jobs, vacation, or hobbies more often, have less time for friends or family, and work more difficulties than caregivers of people with physical impairment.[77] Therefore, they have significant unmet needs and barriers to addressing their health requirements such as exercise, diet, and having time to themselves, and they lack social support and experience social isolation.[16] It was found that social isolation was reported by spouses than by patients' childrens.[73] Possibly with the caregiving consistently, the role of caregiver can change from the marital relationship to a parental relationship. Neuropsychiatric symptoms associated with AD, such as wandering, incontinence, and agitation, require much more self-sacrifice to accommodate their caregiving role.[78]

4.4 | Financial stressors

One of the most common causes of caregiver burden is imbalancing caregiving and work responsibilities. Almost 60% of American family caregivers of people with dementia are also employed.[3] According to the Alzheimer's Association's data in 2014, 54% of dementia caregivers had to go the job in late/leave early and 17% of them had to give up their jobs since they began caregiving.[6] The other work-related challenges are going from work full to part time, losing job benefits, choosing early retirement, and taking a less demanding job after assuming caregiving responsibilities.[6] Although the economic disadvantage associated with caregiving is significant, very few people receive financial supports from goverment.[3] A recent study demonstrated that NPs such as agitation (54%) were common reasons that apply to the emergency departments in patients with AD.[79] The other study also showed that emergency department visits, hospitalization, and costs were significantly higher among the group with NPs.[80] All these findings suggest that NPs can increase families' health expenditures, and families may spend a greater proportion of their income on health care for the person with dementia. Consequently, financial limitations were associated with caregiver burden.

5 | EFFECTS OF CAREGIVER BURDEN ON NEUROPSYCHIATRIC SYMPTOMS OF DEMENTIA

While the negative effects of NPs on caregivers are well documented, there is little known how caregiver burden affects on the occurrence and severity of NPs. Caregiver burden and poor relationship between the patient and caregiver can exacerbate NPs. It was reported that the caregivers' rating of a poorer quality of the relationship with the patients was found to be a significant predictor, and the patients' irritability due to the NPS emerges as an independent predictor of caregiver distress when the quality of the relationship is removed from the analysis. This condition had been explained by Mahoney et al as follows: NPs may lead to a worse relationship with the caregiver, and this altered relationship may lead the patients with NPs to be more irritable, or those caregivers with a poorer relationship may perceive NPs as more severe or as purposefully provocative behaviours.[81] A study by Perren et al found that the higher level of caregiver burden and insecure attachment style were associated with increased levels of NPs.[82] Inappropriate caregiver's manner was reported to be associated with delusions, and the pharmacological treatment of delusions could reduce both delusions and caregiver burden.[55] Moreover, previous studies showed that distressed caregivers tended to use emotion-oriented rather than problem-focus coping strategies, which seems to increase patient's behavioral disturbance.[83,84] Additionally, de Vugt et al have demonstrated that hyperactive behaviors in dementia patients may be triggered by poor interactions between caregivers and care receivers.[85] Caregiver's irritation, anger, or impatience can lead to greater agitation in the patients.[86]

Caregiver burden is directly correlated with the quality of care for the individual with AD and related dementias. According to Mohamed et al,[34] while there is consistent relationships between measures of perceived burden and depression among caregivers and patients' NPs and quality of life, there is only limited relationships to cognitive function and activities of daily living. Furthermore, they reported that severity of NPs, lower functional capabilities, and diminished patients' quality of life are significantly linked to higher levels of burden and depression among caregivers.[34] On the other hand, Mohammed et al found that improving in NPs at follow-up was associated with change in caregiver burden points to the potential amenability of caregiver burden to treatments that are effective in ameliorating patients' behavioral disturbances.[34] The small number of studies that investigated the effect of caregiver's training on NPs of the patients with dementia showed that in a 3-month, after psychoeducative group intervention with their caregivers, there is a significant improvement in agitation and anxiety in patients affected by dementia.[87,88] A recent meta-analysis, including randomized controlled trials, showed that the total score of NPs with older people with dementia and aggressive behaviors decreased significantly after receiving massage or touch.[88] Accordingly, these findings emphasize the importance of caregivers' education to improve NPs.

Therefore, combinations of pharmacological and behavioral and family interventions targeting NPs are likely to not only alleviate patient suffering but also mediate improved caregiver well-being; however, the clinical impact of these interventions in this area has not been completely ascertained and more evidence is required.

6 | INTERVENTIONS TO REDUCE CAREGIVER BURDEN

Caregiving is complex and requires interplay between the care recipient and the caregiver, the extended family, various health care providers, and the community of whom plays a different role in providing the best possible care and keep the patient with dementia without resulting in distress for family caregivers.[89] There are many more interventions for caregiver in an attempt to reduce the caregiver burden. Additionally, management of the NPs of the patients also reduces the burden. In a recent meta-analysis, the interventions for caregivers are unnumbered as education, training, counseling, support groups, stress management, exercise and health promotion, computerized telephone system, role play, environmental modification, practice, and schedule engagement in pleasant activities. It was reported that all these interventions have positive effect on caregiver distress, by improving their depression, health, burden, and social support and that of them, counseling, support group, education, stress and mood management, or telephone support that are significantly effective interventions.[90] Zimmerman et al have also showed that educational resources, focusing on care of comorbidities of patients with dementia, might be useful for family caregiver outcomes.[91] In another recent study, it was demonstrated that Alzheimer café, which is instructed to aim the educating about the AD symptoms, discussing the problem, but also making the disease more acceptable to both persons with dementia and caregivers, is more beneficial for caregivers rather than patients with dementia, suggesting that Alzheimer café may produce better management of social and lead to better emotional support.[92] All these interventions can decrease not only caregiver burden but also caregivers' negative reactions to NPs, which may reduce NPs in patients with dementia.

7 | CONCLUSION

Family caregivers are critical partners in the plan of care for patients with chronic illnesses such as AD. They refer to an unpaid family member, friend, or neighbor who provides care to an individual who has an acute or chronic condition and needs assistance to manage a variety of tasks. When caregivers cope with all these tasks, interventions for not only caregivers but also for patients with AD should be developed to abate caregiver burden. Strategies to support caregivers of patients with AD should have multicomponent interventions to improve the health and well-being of dementia caregivers by relieving the negative effects of caregiving. Specific interventions, including helping caregivers with management of dementia-related symptoms, such as both cognitive impairment and NPs, avoiding social isolation, resolving preexisting personal problems between caregivers and patients, improving social support for caregivers, and providing them with respite from the duties, should focus on caregivers. On the other hand, pharmacological and nonpharmacological treatments of NPs are also very important to decrease caregiver distress and to increase quality of the care. Therefore, when the aforementioned close relationship between caregiver burden and NPs are considered, to improve one of them can be beneficial for the other.

CONFLICT OF INTEREST

None declared.

ORCID

Pinar Soysal http://orcid.org/0000-0002-6042-1718
Nicola Veronese http://orcid.org/0000-0002-9328-289X

REFERENCES

1. Prince M, Bryce R, Albanese E, Wimo A, Ribeiro W, Ferri CP. The global prevalence of dementia: a systematic review and metaanalysis. *Alzheimers Dement*. 2013;9(1):63-75. https://doi.org/10.1016/j.jalz.2012.11.007
2. Wimo A, Jönsson L, Bond J, Prince M, Winblad B. The worldwide economic impact of dementia 2010. *Alzheimers Dement*. 2013;9(1):1-11. https://doi.org/10.1016/j.jalz.2012.11.006
3. Brodaty H, Donkin M. Family caregivers of people with dementia. *Dialogues Clin Neurosci*. 2009;11(2):217-228. https://doi.org/10.1002/gps
4. Schulz R, Martire LM. Family caregiving of persons with dementia: prevalence, health effects, and support strategies. *Am J Geriatr Psychiatry*. 2004;12 (June):240-249. https://doi.org/10.1176/appi.ajgp.12.3.240
5. Association A. 2017 Alzheimer's disease facts and figures. *Alzheimers Dement*. 2017;13(4):325-373. https://doi.org/10.1016/j.jalz.2017.02.001
6. Association A. 2015 Alzheimer's disease facts and figures. *Alzheimers Dement*. 2015;11(3):332-384. https://doi.org/10.1016/j.jalz.2015.02.003
7. Ory MG, Hoffman RR, Yee JL, Tennstedt S, Schulz R. Prevalence and impact of caregiving: a detailed comparison between dementia and nondementia caregivers. *Gerontologist*. 1999;39(2):177-185. https://doi.org/10.1093/geront/39.2.177
8. Shim SH, Kang HS, Kim JH, Kim DK. Factors associated with caregiver burden in dementia: 1-year follow-up study. *Psychiatry Investig*. 2016;13(1):43-49. https://doi.org/10.4306/pi.2016.13.1.43
9. Coen RF, Swanwick GRJ, O'Boyle CA, Coakley D. Behaviour disturbance and other predictors of carer burden in Alzheimer's disease. *Int J Geriatr Psychiatry*. 1997;12(3):331-336. https://doi.org/10.1002/(SICI)1099-1166(199703)12:3<331::AID-GPS495>3.0.CO;2-J
10. Ulstein ID, Sandvik L, Wyller TB, Engedal K. A one-year randomized controlled psychosocial intervention study among family carers of dementia patients—effects on patients and carers. *Dement Geriatr Cogn Disord*. 2007;24(6):469-475. https://doi.org/10.1159/000110740
11. Etters L, Goodall D, Harrison BE. Caregiver burden among dementia patient caregivers: a review of the literature. *J Am Acad Nurse Pract*. 2008;20(8):423-428. https://doi.org/10.1111/j.1745-7599.2008.00342.x
12. Srivastava G, Tripathi RK, Tiwari SC, Singh B, Tripathi SM. Caregiver burden and quality of life of key caregivers of patients with dementia. *Indian J Psychol Med*. 2016;38(2):133-136. https://doi.org/10.4103/0253-7176.178779
13. Grossberg GT, Christensen DD, Griffith P a, Kerwin DR, Hunt G, Hall EJ. The art of sharing the diagnosis and management of Alzheimer's disease with patients and caregivers: recommendations of an expert consensus panel. *Prim Care Companion J Clin Psychiatry*. 2010;12:PCC.09cs00833. https://doi.org/10.4088/PCC.09cs00833oli
14. Vickrey BG, Mittman BS, Connor KI, et al. The effect of a disease management intervention on quality and outcomes of dementia care: a randomized, controlled trial. *Ann Intern Med*. 2006;145(10):713. http://search.ebscohost.com/login.aspx?direct=true&db=jlh&AN=2009348647&site=ehost-live-726.
15. Kasuya RT, Polgar-Bailey P, Takeuchi R. Caregiver burden and burnout. A guide for primary care physicians. *Postgrad Med*. 2000;108(7):119-123. https://doi.org/10.3810/pgm.2000.12.1324
16. National Alliance for Caregiving. Caregiving in the U.S. 2009. In: *Caregiving in the US*, 2009; 2009:4–5.
17. Volicer L. Caregiver burden in dementia care: prevalence and health effects. *Curr Psychos Ther Reports*. 2005;3(1):20-25. https://doi.org/10.1007/BF02629405
18. Wang Q-H, Wang X, Bu X-L, et al. Comorbidity burden of dementia: a hospital-based retrospective study from 2003 to 2012 in seven cities in China. *Neurosci Bull*. November 2017;33(6):703-710. https://doi.org/10.1007/s12264-017-0193-3
19. Soysal P, Isik AT. Effects of acetylcholinesterase inhibitors on nutritional status in elderly patients with dementia: a 6-month follow-up study. *J Nutr Health Aging*. 2016;20(4):398-403. https://doi.org/10.1007/s12603-015-0603-z
20. Gussekloo J, de Craen AJM, Oduber C, van Boxtel MPJ, Westendorp RGJ. Sensory impairment and cognitive functioning in oldest-old subjects—the Leiden 85+study. *Am J Geriatr Psychiatry*. 2005;13(9):781-786. https://doi.org/10.1176/appi.ajgp.13.9.781
21. Panza F, Lozupone M, Solfrizzi V, et al. Cognitive frailty: a potential target for secondary prevention of dementia. *Expert Opin Drug Metab Toxicol*. 2017;13(10):1023-1027. https://doi.org/10.1080/17425255.2017.1372424
22. Soysal P, Stubbs B, Lucato P, et al. Inflammation and frailty in the elderly: a systematic review and meta-analysis. *Ageing Res Rev*. 2016;31:1-8. https://doi.org/10.1016/j.arr.2016.08.006
23. Soysal P, Isik AT, Carvalho AF, et al. Oxidative stress and frailty: a systematic review and synthesis of the best evidence. *Maturitas*. 2017;99:66-72. https://doi.org/10.1016/j.maturitas.2017.01.006
24. Panza F, Lozupone M, Solfrizzi V, et al. Different cognitive frailty models and health- and cognitive-related outcomes in older age: from

epidemiology to prevention. *J Alzheimers Dis*. 2018;62(3):993-1012. https://doi.org/10.3233/JAD-170963

25. Isik AT. Late onset Alzheimer's disease in older people. *Clin Interv Aging*. 2010;5:307-311. https://doi.org/10.2147/CIA.S11718
26. Dauphinot V, Delphin-Combe F, Mouchoux C, et al. Risk factors of caregiver burden among patients with Alzheimer's disease or related disorders: a cross-sectional study. *J Alzheimers Dis*. 2015; 44(3):907-916. https://doi.org/10.3233/JAD-142337
27. Park M, Lee DY, Sung MR, Kim SK, Kim S, Sohn BK. Risk factors of family caregiver burden: results from a large community dataset. *Alzheimers Dement*. 2013;9(4 Suppl. 1):P483-P484.
28. Chun M, Knight BG, Youn G. Differences in stress and coping models of emotional distress among Korean, Korean-American and White-American caregivers. *Aging Ment Health*. 2007;11(1):20-29. https://doi.org/10.1080/13607860600736232
29. Cooper C, Balamurali TBS, Selwood A, Livingston G. A systematic review of intervention studies about anxiety in caregivers of people with dementia. *Int J Geriatr Psychiatry*. 2007;22(3):181-188. https://doi.org/10.1002/gps.1656
30. Livingston G, Mahoney R, Regan C, Katona C. The Caregivers for Alzheimer's disease Problems Scale (CAPS): development of a new scale within the LASER-AD study. *Age Ageing*. 2005;34(3):287-290. https://doi.org/10.1093/ageing/afi103
31. Pekkarinen L, Sinervo T, Perala ML, Elovainio M. Work stressors and the quality of life in long-term care units. *Gerontologist*. 2004; 44(5):633-643. https://doi.org/10.1093/geront/44.5.633
32. Zarit SH, Femia EE, Kim K, Whitlatch CJ. The structure of risk factors and outcomes for family caregivers: implications for assessment and treatment. *Aging Ment Health*. 2010;14(2):220-231. https://doi.org/10.1080/13607860903167861
33. Han SJ, Lee S, Kim JY, Kim H. Factors associated with family caregiver burden for patients with dementia: a literature review. *J Korean Gerontol Nurs*. 2014;16(3):242-254. https://doi.org/10.17079/jkgn.2014.16.3.242
34. Mohamed S, Rosenheck R, Lyketsos KSL. Caregiver burden in Alzheimer's disease: cross sectional and longitudinal patient correlates. *Am J Geriatr Psychiatry*. 2010;18(10):917-927. https://doi.org/10.1097/JGP.0b013e3181d5745d.Caregiver
35. Chiao C, Wu H, Hsiao C-Y. Caregiver burden for informal caregivers of patients with dementia: a systematic review. *Int Nurs Rev*. 2015; 62(3):340-350. https://doi.org/10.1111/inr.12194
36. Torrisi M, De Cola MC, Marra A, De Luca R, Bramanti P, Calabrò RS. Neuropsychiatric symptoms in dementia may predict caregiver burden: a Sicilian exploratory study. *Psychogeriatrics*. 2017;17(2):103-107. https://doi.org/10.1111/psyg.12197
37. Steinberg M, Shao H, Zandi P, et al. Point and 5-year period prevalence of neuropsychiatric symptoms in dementia: the Cache County study. *Int J Geriatr Psychiatry*. 2008;23(2):170-177. https://doi.org/10.1002/gps.1858
38. Dauphinot V, Ravier A, Novais T, Delphin-Combe F, Mouchoux C, Krolak-Salmon P. Risk factors of caregiver burden evolution, for patients with subjective cognitive decline or neurocognitive disorders: a longitudinal analysis. *J Am Med Dir Assoc*. 2016;17(11):1037-1043. https://doi.org/10.1016/j.jamda.2016.07.003
39. Conde-Sala JL, Turró-Garriga O, Calvó-Perxas L, Vilalta-Franch J, Lopez-Pousa S, Garre-Olmo J. Three-year trajectories of caregiver burden in Alzheimer's disease. *J Alzheimers Dis*. 2014;42(2):623-633. https://doi.org/10.3233/JAD-140360
40. Cerejeira J, Lagarto L, Mukaetova-Ladinska EB. Behavioral and psychological symptoms of dementia. *Front Neurol*. 2012; https://doi.org/10.3389/fneur.2012.00073;3.
41. Scarmeas N, Brandt J, Blacker D, et al. Disruptive behavior as a predictor in Alzheimer disease. *Arch Neurol*. 2007;64(12):1755-1761. https://doi.org/10.1001/archneur.64.12.1755
42. Holtzer R, Tang MX, Devanand DP, et al. Psychopathological features in Alzheimer's disease: course and relationship with cognitive status. *J Am Geriatr Soc*. 2003;51(7):953-960.
43. Cheng ST. Dementia caregiver burden: a research update and critical analysis. *Curr Psychiatry Rep*. 2017;19(9):64. https://doi.org/10.1007/s11920-017-0818-2
44. Gitlin LN, Winter L, Dennis MP, Hodgson N, Hauck WW. Targeting and managing behavioral symptoms in individuals with dementia: a randomized trial of a nonpharmacological intervention. *J Am Geriatr Soc*. 2010;58(8):1465-1474. https://doi.org/10.1111/j.1532-5415.2010.02971.x
45. Matsumoto N, Ikeda M, Fukuhara R, et al. Caregiver burden associated with behavioral and psychological symptoms of dementia in elderly people in the local community. *Dement Geriatr Cogn Disord*. 2007; 23(4):219-224. https://doi.org/10.1159/000099472
46. Feast A, Moniz-Cook E, Stoner C, Charlesworth G, Orrell M. A systematic review of the relationship between behavioral and psychological symptoms (BPSD) and caregiver well-being. *Int Psychogeriatr*. 2016;28(11):1761-1774. https://doi.org/10.1017/S1041610216000922
47. Ballard C, Lowery K, Powell I, OBrien J, James I. Impact of behavioral and psychological symptoms of dementia on caregivers. *Int Psychogeriatr*. 2000;12(S1):93-105. https://doi.org/10.1017/S1041610200006840
48. Chiu YC, Lee YN, Wang PC, et al. Family caregivers' sleep disturbance and its associations with multilevel stressors when caring for patients with dementia. *Aging Ment Health*. 2014;18(1):92-101. https://doi.org/10.1080/13607863.2013.837141
49. Berger G, Bernhardt T, Weimer E, Peters J, Kratzsch T, Frolich L. Longitudinal study on the relationship between symptomatology of dementia and levels of subjective burden and depression among family caregivers in memory clinic patients. *J Geriatr Psychiatry Neurol*. 2005;18(3):119-128. https://doi.org/10.1177/0891988704273375
50. van Duinen-van IJssel JCL, Mulders AJMJ, Smalbrugge M, et al. Nursing staff distress associated with neuropsychiatric symptoms in young-onset dementia and late-onset dementia. *J Am Med Dir Assoc*. 2017;19(7):627-632. https://doi.org/10.1016/j.jamda.2017.10.004
51. Balieiro APJ, Sobreira EST, Pena MCS, Silva-Filho JH, de Assis Carvalho Vale F. Caregiver distress associated with behavioral and psychological symptoms in mild Alzheimer's disease. *Dement Neuropsychol*. 2010;4(3):238-244.
52. Lou Q, Liu S, Huo YR, Liu M, Liu S, Ji Y. Comprehensive analysis of patient and caregiver predictors for caregiver burden, anxiety and depression in Alzheimer's disease. *J Clin Nurs*. 2015;24(17–18):2668-2678. https://doi.org/10.1111/jocn.12870
53. Paton J, Johnston K, Katona C, Livingston G. What causes problems in Alzheimer's disease: attributions by caregiver. A qualitative study. *Int J Geriatr Psychiatry*. 2004;19(6):527-532. https://doi.org/10.1002/gps.1118
54. Lima-Silva TB, Bahia VS, Carvalho VA, et al. Neuropsychiatric symptoms, caregiver burden and distress in behavioral-variant frontotemporal dementia and Alzheimer's disease. *Dement Geriatr Cogn Disord*. 2015;40(5–6):268-275. https://doi.org/10.1159/000437351
55. Riello R, Geroldi C, Zanetti O, Frisoni GB. Caregiver's distress is associated with delusions in alzheimer's patients. *Behav Med*. 2002;28(3):92-98. https://doi.org/10.1080/08964280209596047
56. Connors MH, Ames D, Woodward M, Brodaty H. Psychosis and clinical outcomes in Alzheimer disease: a longitudinal study. *Am J Geriatr Psychiatry*. 2017;26(3):304-313. https://doi.org/10.1016/j.jagp.2017.10.011
57. Cipriani G, Danti S, Vedovello M, Nuti A, Lucetti C. Understanding delusion in dementia: a review. *Geriatr Gerontol Int*. 2014; 14(1):32-39. https://doi.org/10.1111/ggi.12105
58. Cipriani G, Vedovello M, Nuti A, Di Fiorino A. Dangerous passion: Othello syndrome and dementia. *Psychiatry Clin Neurosci*. 2012;66(6):467-473. https://doi.org/10.1111/j.1440-1819.2012.02386.x

59. Shigenobu K, Ikeda M, Fukuhara R, et al. Reducing the burden of caring for Alzheimer's disease through the amelioration of "delusions of theft" by drug therapy. *Int J Geriatr Psychiatry*. 2002;17(3):211-217. https://doi.org/10.1002/gps.551
60. Godinho C, Camozzato A, Kochhann R, Lorena M, Chaves F. Association of caregiver demographic variables with neuropsychiatric symptoms in Alzheimer's disease patients for distress on the Neuropsychiatric Inventory (NPI). *Dement Neuropsychol*. 2008;2(3):211-216. https://doi.org/10.1590/S1980-57642009DN20300009
61. Sousa MFB, Santos RL, Turró-Garriga O, Dias R, Dourado MCN, Conde-Sala JL. Factors associated with caregiver burden: comparative study between Brazilian and Spanish caregivers of patients with Alzheimer's disease (AD). *Int Psychogeriatr*. 2016;28(8):1363-1374. https://doi.org/10.1017/S1041610216000508
62. Allegri RF, Sarasola D, Serrano CM, et al. Neuropsychiatric symptoms as a predictor of caregiver burden in Alzheimer's disease. *Neuropsychiatr Dis Treat*. 2006;2(1):105-110.
63. Fuh JL, Liu CK, Mega MS, Wang SJ, Cummings JL. Behavioral disorders and caregivers' reaction in Taiwanese patients with Alzheimer's disease. *Int Psychogeriatr*. 2001;13(1):121-128.
64. Gehrman P, Gooneratne NS, Brewster GS, Richards KC, Karlawish J. Impact of Alzheimer disease patients' sleep disturbances on their caregivers. *Geriatr Nurs*. 2018;39(1):60-65. https://doi.org/10.1016/j.gerinurse.2017.06.003
65. McCurry SM, Logsdon RG, Teri L, et al. Characteristics of sleep disturbance in community-dwelling Alzheimer's disease patients. *J Geriatr Psychiatry Neurol*. 1999;12(2):53-59. https://doi.org/10.1177/089198879901200203
66. Tractenberg RE, Singer CM, Cummings JL, Thal LJ. The Sleep Disorders Inventory: an instrument for studies of sleep disturbance in persons with Alzheimer's disease. *J Sleep Res*. 2003;12(4):331-337. https://doi.org/10.1046/j.0962-1105.2003.00374.x
67. De Vugt ME, Riedijk SR, Aalten P, Tibben A, Van Swieten JC, Verhey FRJ. Impact of behavioural problems on spousal caregivers: a comparison between Alzheimer's disease and frontotemporal dementia. *Dement Geriatr Cogn Disord*. 2006;22(1):35-41. https://doi.org/10.1159/000093102
68. Canevelli M, Lucchini F, Garofalo C, et al. Inappropriate sexual behaviors among community-dwelling patients with dementia. *Am J Geriatr Psychiatry*. 2017;25(4):365-371. https://doi.org/10.1016/j.jagp.2016.11.020
69. Regier NG, Gitlin LN. Dementia-related restlessness: relationship to characteristics of persons with dementia and family caregivers. *Int J Geriatr Psychiatry*. 2017;33(1):185-192. https://doi.org/10.1002/gps.4705
70. Chen CT, Chang C-C, Chang W-N, et al. Neuropsychiatric symptoms in Alzheimer's disease: associations with caregiver burden and treatment outcomes. *QJM*. 2017;110(9):565-570. https://doi.org/10.1093/qjmed/hcx077
71. de Vugt ME, Nicolson NA, Aalten P, Lousberg R, Jolle J, Verhey FRJ. Behavioral problems in dementia patients and salivary cortisol patterns in caregivers. *J Neuropsychiatry Clin Neurosci*. 2005;17(2):201-207. https://doi.org/10.1176/jnp.17.2.201
72. Von Känel R, Mills PJ, Mausbach BT, et al. Effect of Alzheimer caregiving on circulating levels of C-reactive protein and other biomarkers relevant to cardiovascular disease risk: a longitudinal study. *Gerontology*. 2012;58(4):354-365. https://doi.org/10.1159/000334219
73. Vitaliano PP, Zhang J, Scanlan JM. Is caregiving hazardous to one's physical health? A Meta-Analysis. *Psychol Bull*. 2003;129(6):946-972. https://doi.org/10.1037/0033-2909.129.6.946
74. Brown SL, Smith DM, Schulz R, et al. Caregiving behavior is associated with decreased mortality risk. *Psychol Sci*. 2009;20(4):488-494. https://doi.org/10.1111/j.1467-9280.2009.02323.x
75. Vellone E, Piras G, Sansoni J. Stress, anxiety, and depression among caregivers of patients with Alzheimer's disease. *Ann Ig*. 2002;14(3):223-232.
76. Cotelo NV, Rodriguez NFA, Perez JAF, Iglesias JCA, Lago MR. Burden and associated pathologies in family caregivers of Alzheimer's disease patients in Spain. *Pharm Pract (Granada)*. 2015;13(2):521-313. https://doi.org/10.3988/jcn.2014.10.4.304
77. Markowitz JS, Gutterman EM, Sadik K, Papadopoulos G. Health-related quality of life for caregivers of patients with Alzheimer disease. *Alzheimer Dis Assoc Disord*. 2003;17(4):209-214.
78. Drentea P, Clay OJ, Roth DL, Mittelman MS. Predictors of improvement in social support: five-year effects of a structured intervention for caregivers of spouses with Alzheimer's disease. *Soc Sci Med*. 2006;63(4):957-967. https://doi.org/10.1016/j.socscimed.2006.02.020
79. Sampson EL, Candy B, Davis S, et al. Living and dying with advanced dementia: a prospective cohort study of symptoms, service use and care at the end of life. *Palliat Med*. 2017;32(3):668-681. https://doi.org/10.1177/0269216317726443
80. Soto ME, Andrieu S, Villars H, et al. Improving care of older adults with dementia: description of 6299 hospitalizations over 11 years in a special acute care unit. *J Am Med Dir Assoc*. 2012;13(5):486.e1-486.e6. https://doi.org/10.1016/j.jamda.2011.12.058
81. Mahoney R, Regan C. Cornelius Katona Mrcp, Livingston G. Anxiety and depression in family caregivers of people with Alzheimer disease: the LASER-AD study. *Am J Geriatr Psychiatry*. 2005;13(9):795-801. https://doi.org/10.1097/00019442-200509000-00008
82. Perren S, Schmid R, Herrmann S, Wettstein A. The impact of attachment on dementia-related problem behavior and spousal caregivers' well-being. *Attach Hum Dev*. 2007;9(2):163-178. https://doi.org/10.1080/14616730701349630
83. Almberg B, Grafström M, Winblad B. Major strain and coping strategies as reported by family members who care for aged demented relatives. *J Adv Nurs*. 1997;26(4):683-691. https://doi.org/10.1046/j.1365-2648.1997.00392.x
84. Vitaliano PP, Young HM, Russo J, Romano J, Magana-Amato A. Does expressed emotion in spouses predict subsequent problems among care recipients with Alzheimer's disease? *J Gerontol*. 1993;48(0022–1422):202-209. https://doi.org/10.1093/geronj/48.4.P202
85. De Vugt ME, Stevens F, Aalten P, et al. Do caregiver management strategies influence patient behaviour in dementia? *Int J Geriatr Psychiatry*. 2004;19(1):85-92. https://doi.org/10.1002/gps.1044
86. Hamel M, Gold DP, Andres D, et al. Predictors and consequences of aggressive behavior by community-based dementia patients. *Gerontologist*. 1990;30(2):206-211. https://doi.org/10.1093/geront/30.2.206
87. Haupt M, Karger A, Jänner M. Improvement of agitation and anxiety in demented patients after psychoeducative group intervention with their caregivers. *Int J Geriatr Psychiatry*. 2000;15(12):1125-1129. https://doi.org/10.1002/1099-1166(200012)15:12<1125::AID-GPS257>3.0.CO;2-F
88. Haupt M, Karger a, Baumgärtner D, Kuminoti D, Jänner M, Schneider F. Improvement of agitation and anxiety in dementia patients after psychoeducative training of their caregivers. *Fortschr Neurol Psychiatr*. 2000;68(5):216-223. https://doi.org/10.1055/s-2000-11632
89. Villapando MV. Lightening the load: an overview of caregiver burden in dementia care. *Home Healthc Now*. 2015;33(4):190-196. https://doi.org/10.1097/NHH.0000000000000223
90. Tible OP, Riese F, Savaskan E, Von Gunten A. Best practice in the management of behavioural and psychological symptoms of dementia. *Ther Adv Neurol Disord*. 2017;10(8):297-309. https://doi.org/10.1177/1756285617712979
91. Zimmerman S, Sloane PD, Ward K, et al. Helping dementia caregivers manage medical problems: benefits of an educational resource. *Am J Alzheimers Dis Other Demen*. 2018;33(3):176-183.

92. Merlo P, Devita M, Mandelli A, et al. Alzheimer Café: an approach focused on Alzheimer's patients but with remarkable values on the quality of life of their caregivers. *Aging Clin Exp Res*. 2017;1-8.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Isik AT, Soysal P, Solmi M, Veronese N. Bidirectional relationship between caregiver burden and neuropsychiatric symptoms in patients with Alzheimer's disease: A narrative review. *Int J Geriatr Psychiatry*. 2019;34: 1326–1335. https://doi.org/10.1002/gps.4965