


Association between Role Overload and Sleep Disturbance among Dementia Caregivers: The Impact of Social Support and Social Engagement

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Abstract

Objective: To explore the association between role overload (RO) and sleep maintenance insomnia (SMI), and the moderation effects of social support and social engagement (SE). **Methods:** We report a cross-sectional study using data drawn from the 2015 National Health and Aging Trends Study and National Study of Caregiving. We used multiple regression and controlled for demographics and potential confounders. **Results:** Nearly 45% of caregivers reported suffering from SMI during “some” and “more” nights within the past month with one half reporting “almost” or “every” night. RO was found positively associated with the risk of SMI. Instrumental support moderated the effect of RO on SMI overall, although moderation was limited to a subsample of adult children caregivers. **Discussion:** The sleep quality of dementia caregivers may be affected by RO, particularly for adult children caregivers. Increasing instrumental support may be beneficial to caregiver’s sleep quality.

Keywords

dementia caregivers, sleep maintenance insomnia, role overload, instrumental support, relationship type

Introduction

The care of people with dementia (PWD) is intense and complex, and is reported to have negative impacts on the sleep quality of caregivers (Leggett et al., 2018; McCurry et al., 2007). Caregiver burden describes the stress that family caregivers experience managing care-related tasks (Fredman et al., 2019). While caregivers may face varying degrees of burden, they also have differential resilience and coping capacity. Although stress may directly impact health among dementia caregivers, access to social resources, such as social support and social engagement (SE), could buffer its effect.

This study assesses whether perceived caregiver burden (specifically role overload [RO]) in dementia caregivers is associated with sleep maintenance insomnia (SMI) and explores whether social resources, including social support and SE, ameliorate such sleep problems.

(Wolff et al., 2016). Family caregiving can be a normative expectation in family life, and caregiving can involve both positive and negative experiences. The negative impact of caregiving is well established across many domains including the realm of sleep. Evidence of sleep disturbance in caregivers of PWD has been widely reported since the 1980s as a significant health problem affecting physical and mental health (i.e., cardiovascular disease, stroke, and depression) (Carter, 2005; Chenoweth & Spencer, 1986; Gaynor, 1989; Leggett et al., 2018; Liu et al., 2017). Current estimates indicate that caregivers of PWD sleep on average only 6.5 hours per night compared with the recommended 7–8 hours (McKibbin et al., 2005). Moreover, caregivers’ sleep problems are likely to continue even after PWDs’ nursing home placement or death (Carter, 2005).

While there have been many studies on the prevalence and causes of insomnia and sleep disturbance among dementia

Sleep Disturbance and Family Caregivers of PWD

Over 70% of PWD live in communities and are cared for by family members (Kasper et al., 2015) who expend significant time, energy, and financial resources in their caregiving roles

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caregivers, few focus on the specific symptoms of insomnia, so evidence for developing intervention strategies is scarce. The current study focuses on SMI defined as when individuals experience wakefulness during the night or early morning before their intended waking time and have difficulty falling back to sleep (Waters et al., 1993). The construct of SMI has been widely used in previous studies which suggest sleep maintenance difficulty increases the risk for mental disorders (Meeker et al., 2019), hypertension (Cheng et al., 2015), and greater healthcare utilization (Bolge et al., 2010). It remains unclear what aspects of their role and context contribute to SMI among dementia caregivers. The purpose of our study was to elucidate this question. To guide our approach, we draw from the stress process model of caregiving (SPM) (Pearlin et al., 1990). The SPM was employed by previous studies to help explain illnesses including depression, hypertension, and substance use (Aranda & Knight, 1997; Pearlin et al., 1990; Russell & Cutrona, 1991; Turner, 2010).

Association of RO and Sleep Disturbance

Previous research suggests that age, gender, chronic disease, and mental health status are related to caregivers' sleep quality (McCurry et al., 2007). The caregiving context may also contribute, but the research on such factors is relatively rare. The SPM outlines several pathways through which caregiving-related stress may affect caregivers. Studies examining the impact of caregiver burden on sleep quality have considered objective stressors including PWD's need for assistance with activities of daily living and medication management (Liu et al., 2017). Yet, the effects of subjective stressors, such as RO, have not been tested. Given the principle that a situation perceived as real is real in its consequences (Thomas & Thomas, 1928), caregiving RO and factors that could buffer its effects should be considered in the study of disrupted sleep.

RO is defined as the individual's perception of too many role demands and too little time to fulfill them (Coverman, 1989), which may exacerbate health outcomes. The SPM suggests that RO is but one aspect of the broader concept of caregiver burden; in addition, there are financial, emotional, and social dimensions to the role of caregivers (Pearlin, 1989). The measure of RO should reflect the caregiver's experience of fatigue, estimate the nature of stressors in the caregiving context, and also consider caregivers' concerns about changes in their own life patterns (Zarit et al., 1980). Previous studies have revealed the negative impact of caregivers' RO on several outcomes, such as higher depression, lower self-efficacy, and avoidance coping (Edwards et al., 2002; Gallagher et al., 1994; Mausbach et al., 2011). Few studies have examined the impact of RO on dementia caregivers' sleep quality.

Stress-Buffering Effects of Social Support and SE

Social support refers to an individual's perception or experience of psychological, physical, and informational assistance from social networks (Rook, 1990). The SPM postulates that social support acts as a protective factor against the negative impact of stressors on health outcomes. Many studies highlight the positive influence of social support on caregivers, including reduced caregiving burden, positive attitudes toward the future, and a closer relationship with the PWD (Hopwood et al., 2018; Ong et al., 2018; Thoits, 2011). Social support can promote better sleep in older adults as it contributes to a safe and reliable living context (Troxel et al., 2010). However, little research has examined the impact of social support on the sleep quality of dementia caregivers specifically.

Social engagement is also thought to promote a successful and healthy life. Continued engagement in meaningful social activities can help individuals adjust to older age and maintain positive attitudes and good health (Fang et al., 2019). A number of studies have suggested a positive relationship between SE and both physical and psychological well-being. For example, little involvement with friends and relatives, and lack of engagement in formal or organized activities, results in social isolation, lower self-reported health and health-related quality of life, and increased morbidity and mortality risk (Jang et al., 2004; Kiely et al., 2000). Loneliness or social isolation of dementia caregivers is associated with poor sleep quality and more time awake during night (Hawkley & Capitano, 2014). We hypothesize that greater social support and SE might alleviate the sleep problems associated with RO by mitigating loneliness and social isolation, and test social support and SE as possible moderators of the relationship between RO and SMI.

Stress-Buffering Effects May Vary across Relationship Types

The relationship type between caregivers and PWD is considered to be an important factor in determining the quality of care (Broese van Groenou et al., 2013). Studies have found that spousal and adult children caregivers respond differently to caregiving stress. For example, adult children caregivers tend to face the dual stress of work and family and are more likely to experience RO than spousal caregivers (Halinski et al., 2019). In comparison, spousal caregivers have difficulty maintaining social networks and are inclined to be socially isolated (Wang et al., 2014). In general, the care burden perceived by spousal and adult children caregivers, and the impacts of caregiving on themselves may be different due to their potentially different stress process mechanisms. Little research has explored how the stress-buffering effects of social support and SE work on different relationship types.

In sum, we propose to evaluate the following research questions: Is RO among dementia caregivers associated with SMI? Are social support and SE associated with SMI? Do social support and/or SE moderate the association of RO with SMI? When social support or SE is high, we expect the association of RO with SMI to be weaker. Finally, are the expected moderation effects similar within different relationship types?

Methods

Procedures and Sample

Data were drawn from the 2015 National Health and Aging Trends Study (NHATS) and the 2015 National Study of Caregiving (NSOC). Conducted annually since 2011, the NHATS focuses on the overall health condition and quality of life of older adults in the United States. The supplementary caregiver study NSOC was conducted to study caregivers of older adults in the NHATS. Based on several cognition measures in the NHATS questionnaire, we identified older adults with probable or possible dementia and people they identified as informal caregivers who assist their daily activities. The criteria for dementia screening are adopted from previous research which describes the technical process in detail (Kasper et al., 2013). Participants in the NHATS who meet any of the following three criteria were considered eligible for the study: (1) self-report of dementia diagnosis (322 participants met), (2) a score indicating dementia on the AD8 Dementia Screening Interview (≥ 2) (232 participants met) (Galvin et al., 2006), and (3) impaired performance on cognitive tests of memory (immediate and delayed 10-word recall), orientation (date, month, year, and day of the week; naming the president and vice president), and executive function (clock drawing test) (125 participants met). For the present analysis, we included older adults with probable or possible dementia and not living in an assisted living facility, which was 436 (5.23%) of 8,334 NHATS participants. The caregivers were eligible to participate in the NSOC if they provided NHATS participants assistance with mobility, household chores, or self-care activities without payment. NHATS participants provided the names of those caregivers. Each NHATS participant can list up to five caregivers (if more than five were listed, then five caregivers would be randomly selected). The 436 NHATS participants who have probable or possible dementia had 743 caregivers who participated in the NSOC vis-à-vis a 30-min telephone interview. List-wise deletion removed 74 caregivers with missing data on any of the study variables. Thus, the final analytic sample includes 669 caregivers.

Measures

SMI: Caregivers' sleep disturbance was measured as SMI by using a single-item 5-point scale that asks, "In the last month,

on nights when you woke up before you wanted to, how often did you have trouble falling back asleep?" Scores range from 1 (never) to 5 (every night).

RO includes four items which measure the feelings of exhaustion and fatigue related to caregiving responsibilities. Questions asked how much do caregivers (1) feel exhausted when they go to bed at night, (2) have more things than they can handle, (3) have no time for themselves, and (4) PWDs' needs change frequently (1 = very much, 2 = somewhat, and 3 = not so much). Items were reverse-coded, and the total score ranges from 4 to 12, with higher score indicating higher level of RO (Cronbach's $\alpha = .75$).

Social support: Caregivers' social support comprises four domains which represent the broader context of support that caregivers rely on (Kelley et al., 2017).

Emotional support was measured by the dichotomous variable, "Do you have friends or family that you talk to about important things in your life?" (yes/no).

Service use captures four services utilized by dementia caregivers by asking: "In the past year, have you gone to a {support group/respice care/training/financial help} for people who give care?" Total scores ranging from 0 to 4 were computed by summing the number of services utilized.

Aid finding support counts the number of sources that dementia caregivers use when seeking supportive services. The six sources counted include government or community agency, medical care provider or social worker, church or synagogue, employer, self-guided or from a friend, and other sources of support (i.e., We'd like to understand a little more about how you found out about the {support group}. Did you find out it from...?) Each response was dichotomized, and total scores (from 0 to 6) indicate the number of sources that caregivers used to find services.

Instrumental support was computed from two items which asked dementia caregivers' acceptance of practical support in terms of (a) daily activities and (b) caregiving tasks (i.e., Do you have friends or family that helps you {with your daily activities, such as running errands, or helping you with things around the house/care for <name of PWD>}?)

SE of caregivers was measured by asking about their participation in the following activities: (1) visiting with friends or family; (2) going out for enjoyment (i.e., dinner, movie, concert, and gambling); (3) attending religious services; (4) participating in clubs, classes, or other organized activities; and (5) volunteer work. Each activity was answered with yes (1) or no (0), and total scores range from 0 to 5.

Covariates include the caregiver's age, gender (m/f), race (white/nonwhite), educational attainment (lower than high school/high school but no bachelor degree/bachelor degree or above), marital status (married/nonmarried), and relationship to PWD (spouse/adult child/other). Caregivers also reported activities of daily living (ADLs), instrumental activities of daily living (IADLs), and mobility activities with which they helped PWD in the last month. ADLs include bathing, dressing, eating, toileting, and getting in/out of bed. IADLs

include doing laundry, shopping, preparing meals, banking, and managing money. Mobility includes moving inside and outside the house. Summed scores of ADLs, IADLs, and mobility were determined for total task-specific caregiving intensity (range from 0 to 11) (Fredman et al., 2019). The last covariate included in models is the health status of caregivers. Through bivariate regression analysis, we selected six physical and chronic conditions that are most relevant to SMI (heart disease, hypertension, arthritis, osteoporosis, diabetes, and visual impairment). A count of health conditions was computed for each caregiver (Bolge et al., 2010).

Analytic Strategy

We first generate descriptive results for dementia caregiver variables. To examine the primary research question of association between SMI and RO, we first fit a multiple regression where SMI is the dependent variable and RO is the predictor, with adjustment for covariates ($\beta = .120$ (.018), $p < .01$, unadjusted $R^2 = .144$; not shown in tables). Next, five models are estimated to evaluate the moderation effects of social support and SE, respectively. Model 1.1 assesses the effects of emotional support (ES) with an interaction term of $RO \times ES$. Model 1.2 assesses the effects of service use (SU) and the interaction term of $RO \times SU$ on SMI. Model 1.3 assesses the effects of aid finding support and its interaction with RO on SMI. Model 1.4 assesses the effects of instrumental support (IS) and its interaction with RO. In Model 1.5, the effect of SE is analyzed and an interaction term of $RO \times SE$ is included. In the initial model (above), the relationship type of caregivers to PWD is not related to caregivers' SMI.

However, the relationship type implies particular social roles that caregivers may assume, which is an important factor affecting caregiver burden (Halinski et al., 2019). Therefore, we elaborate the analysis with a series of multiple regression models (Models 2.1–3; we fitted all models and only found significant results in the three models presented), fitted within relationship type subgroups (adult children/spouses) to investigate whether the stress-buffering process varies by relationship type. For multiple regression models, unstandardized coefficients and 95% confidence intervals are reported. Goodness of fit is described by unadjusted R^2 . (Given the multiple regression introduces only one moderating variable and interaction item at a time, the unadjusted R^2 is suitable to compare model fit.) A p -value of $<.05$ is considered statistically significant. Data were analyzed using Stata 14.1 (StataCorp LLC., College Station, TX, USA).

Results

The average age of caregivers is 60.37 (SD : 13.90) years. Over 70% of participants are female; 66% are adult children and 15% are spouses of PWDs. SMI was commonly experienced by caregivers; nearly half of the participants reported

this occurred for some nights or more during the past 30 days (see Table 1).

Multiple regression results show that, after adjusting for all covariates and without considering any impacts from social supports and SE, RO of dementia caregivers is positively associated with SMI in all five models ($p < .01$). When evaluating the moderation effects of different domains of social support and SE on the association between RO and SMI, the results suggest that only the interaction of $RO \times IS$ is significantly related to the frequency of SMI ($\beta = -.014$, 95% CI: $-.028, -.001$). See Table 2, Model 1.4). Most covariates are not related to the caregivers' SMI; only the caregivers' number of health conditions is positively associated with their SMI in all the five models ($p < .01$).

Table 1. Distribution of All Variables among Dementia Caregivers ($N = 669$).

Variable	Mean/N	(SD)/% ^a
Age (years)	60.37	(13.90)
Gender		
Male	198	29.77
Female	467	70.23
Race		
White	367	55.95
Nonwhite	302	45.14
Educational level		
High school or below	246	37.22
Higher than 12th grade but no college degree	223	33.73
Bachelor's degree or higher	192	29.05
Marital status		
Married	416	62.84
Nonmarried	246	37.16
Relationship type ^b		
Spouse/partner	102	15.25
Adult children	443	66.22
Others	124	18.53
Caregiving intensity	7.37	(2.67)
Health conditions ^c	1.38	(1.31)
SMI ^d	2.46	(1.10)
Role overload	6.88	(2.34)
Social support		
Emotional support	.88	(.33)
Service use	.62	(.79)
Aid finding support	.90	(1.24)
Instrumental support	1.33	(.79)
Social engagement	2.72	(1.36)

^aContinuous variables are listed with mean and standard deviation (in parentheses), and categorical variables are presented with frequency and percentage ratio.

^bRelationship type indicates the relationship of caregiver to people with dementia.

^cHealth conditions are the number of physical and chronic diseases.

^dSMI = sleep maintenance insomnia.

Table 2. Moderation Models of Social Support and SE on the Association between RO and SMI ($N = 669$).^a

Variable	Model 1.1	Model 1.2	Model 1.3	Model 1.4	Model 1.5
	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)
RO	.117 (.024, .210)*	.118 (.072, .163)**	.118 (.074, .163)**	.122 (.056, .188)**	.143 (.067, .218)**
Social support					
ES	-.199 (-.981, .584)				
RO \times ES	-.003 (-.101, .095)				
SU		-.054 (-.376, .268)			
RO \times SU		.004 (-.038, .046)			
AFS			-.049 (-.256, .157)		
RO \times AFS			.003 (-.024, .030)		
IS				-.107 (-.210, -.005)*	
RO \times IS				-.015 (-.029, -.001)*	
SE					-.052 (-.118, .013)
RO \times SE					-.011 (-.037, .014)
Age (years)	-.001 (-.008, .007)	.000 (-.007, .007)	.000 (-.007, .007)	.000 (-.008, .007)	.000 (-.007, .007)
Gender					
Male	-.156 (-.340, .028)	-.133 (-.316, .050)	-.134 (-.317, .048)	-.137 (-.320, .046)	-.139 (-.322, .044)
Female (reference)	—	—	—	—	—
Race ^b					
Nonwhite	-.138 (-.308, .032)	-.138 (-.309, .033)	-.134 (-.305, .036)	-.133 (-.304, .038)	-.147 (-.317, .024)
White (reference)	—	—	—	—	—
Educational level ^c					
Group 1	-.168 (-.374, .037)	-.204 (-.409, .001)	-.206 (-.410, -.002)*	-.197 (-.401, -.007)	-.177 (-.372, .019)
Group 2	-.160 (-.354, -.033)	-.188 (-.381, .005)	-.188 (-.381, .005)	-.184 (-.376, .009)	-.168 (-.379, .043)
Group 3 (reference)	—	—	—	—	—
Marital status ^d					
Nonmarried	-.097 (-.279, .086)	-.095 (-.278, .089)	-.092 (-.275, -.091)	-.106 (-.290, .079)	-.110 (-.294, .074)
Married (reference)	—	—	—	—	—
Relationship type ^e					
Spouse/partner	.200 (-.150, .550)	.212 (-.139, .563)	.215 (-.136, .565)	.188 (-.164, .541)	.173 (-.181, .527)
Adult children	.179 (-.043, .401)	.177 (-.047, .402)	.183 (-.041, .407)	.175 (-.048, .399)	.169 (-.053, .392)
Others (reference)	—	—	—	—	—
Caregiving intensity	.029 (-.002, .059)	.029 (-.002, .060)	.029 (-.002, .059)	.029 (-.002, .059)	.025 (-.006, .055)
Health conditions ^f	.155 (.086, .223)**	.150 (.081, .219)**	.150 (.081, .219)**	.149 (.080, .217)**	.151 (.082, .221)**
Constant	1.606 (.701, 2.511)**	1.358 (.773, 1.942)**	1.253 (.667, 1.839)**	1.424 (.703, 2.146)**	1.322 (.562, 2.083)**
Unadjusted R ²	.15	.146	.145	.156	.151

Note. * $p < .05$, ** $p < .01$; RO = role overload; ES = emotional support; SU = service use; AFS = aid finding support; IS = instrumental support; SE = social engagement.

^aSMI: sleep maintenance insomnia.

^bRace was dichotomized as white (reference) and nonwhite.

^cEducational level was categorized as three groups (Group 1: bachelor's degree or higher, Group 2: above high school but no college degree, and Group 3: below or equal to high school (reference)).

^dMarital status was dichotomized as married (includes living with partners; reference) and nonmarried (includes separated).

^eCaregiver's relationship to people with dementia was categorized as spouse/partner, adult children, and others (reference).

^fHealth conditions are the number of physical and chronic diseases.

To elaborate the association between RO and SMI and examine whether the stress-buffering process of social support and SE held for both adult children and spousal caregivers, we estimated models in the two groups. Results show

that only adult children caregivers' perceived RO is positively associated with their SMI ($\beta = .147 (.022)$; see Table 3, Model 2.1) when the moderation effect is not considered. When introducing instrumental social support, a significant

Table 3. Moderation Models for both Adult Children and Spousal Caregivers ($N = 669$).

Variable	Model 2.1		Model 2.2		Model 2.3	
	Adult Children	Spouse	Adult Children	Spouse	Adult Children	Spouse
	β (se)	β (se)	β (se)	β (se)	β (se)	β (se)
RO	.147 (.022)**	.070 (.049)	.127 (.029)**	.149 (.059)*	.221 (.044)**	.009 (.065)
Social support						
SU			-.185 (.188)	1.062 (.563)		
RO \times SU			.027 (.249)	-.149 (.068)*		
IS					-.340 (.124)*	-.659 (.410)
RO \times IS					-.055 (.027)*	.077 (.054)
Constant	.892 (.416)*	1.186 (1.299)	1.031 (.434)*	.733 (1.287)	.444 (.534)	-.039 (.047)
Unadjusted R^2	.158	.131	.160	.186	.168	.157

Note. According to the relationship type (adult children/spouse), the models of the moderation effects of social supports and social engagement on the association between role overload and SMI were fitted. The table only presents three models with significant findings; that is, role overload is positively associated with SMI without considering moderation effects (Model 2.1), SU moderates the association between spousal caregivers' role overload and SMI (Model 2.2), and IS moderates the association between adult children's role overload and SMI (Model 2.3). Among all participants, the sample size of adult children is 443 and of spouse is 102. Multiple regression models adjust for age, gender, race, level of education, marital status, caregiving intensity, and the number of health conditions. * $p < .05$, ** $p < .01$. RO = role overload; SU = service use; IS = instrumental support.

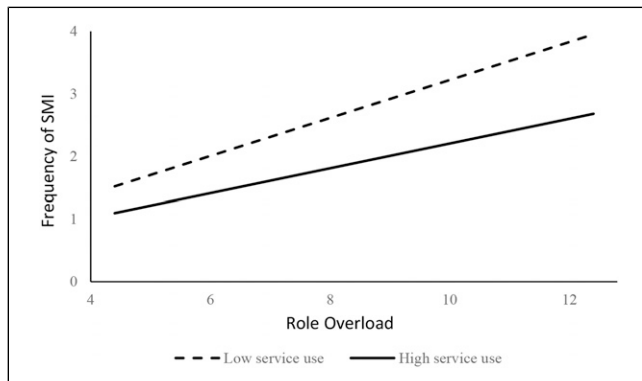


Figure 1. Moderation effect of SU on the association between RO and SMI among spousal caregivers of PWD. The y-axis scale denotes the frequency of SMI from rarely (0) to every night (5). The x-axis shows the scores of RO reported by participants. The two lines indicate the associations among spousal caregivers with high (solid line) and low SU rate (dashed line). Results are based on Model 2.2 in Table 3. Note. SMI = sleep maintenance insomnia; PWD = people with dementia; SU = service use; RO = role overload.

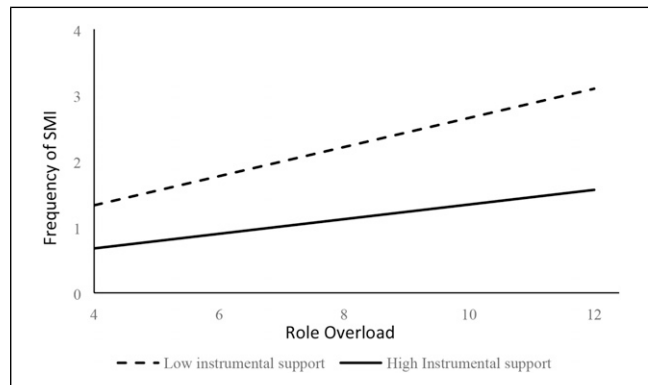


Figure 2. Moderation effect of IS on the association between RO and SMI among adult children caregivers of PWD. The y-axis scale denotes the frequency of SMI from rarely (0) to every night (5). The x-axis shows the scores of RO reported by participants. The two lines indicate the associations among adult children caregivers with high (solid line) and low IS (dashed line). Results are based on Model 2.3 in Table 3. Note. SMI = sleep maintenance insomnia; PWD = people with dementia; IS = instrumental support; RO = role overload.

interaction effect was found only in the adult children caregiver group ($\beta = -.055$ (.027); see Table 3, Model 2.3). Additionally, in the spousal caregiver group, SU showed a significant moderation effect ($\beta = -.149$ (.068); see Table 3, Model 2.2).

Figures 1 and 2, respectively, depict the association between RO and SMI with the moderation effect of SU on spousal caregivers and IS on adult children caregivers. To illustrate the moderation effect, SU and IS are set to low (-1.5 SD) and high ($+1.5$ SD).

Discussion

We examined the association between RO and SMI among caregivers of PWD, as well as the moderating effect of social support and SE on this association. We extend the literature by considering the impact of the subjective stressor—RO—on the risk of SMI of dementia caregivers over and beyond the objective stressor—that is, caregiving intensity. When controlling for RO in the model, there is no association between caregiving intensity and SMI. Thus, caregivers'

perceptions of RO are more salient than the objective demands of the caregiving role. Consistent with the prior caregiver research (Leggett et al., 2018), our findings suggest high rates of sleep disturbance, given that nearly 80% of participants report some degree of SMI during the previous 30 days. RO was found to be associated with the frequency of SMI. The study also addresses the positive effects of social support on SMI and the moderation effect of IS on the caregiving–sleep disturbance mechanism.

Experiencing RO may intensify SMI among dementia caregivers for several reasons. First, RO captures multiple stressors experienced by caregivers (Pearlin et al., 1990). Previous work suggests that performing nighttime care tasks (i.e., monitoring PWD's health conditions and managing medications) is one main reason for sleep disturbances among caregivers (Leggett et al., 2018). Previous studies evaluating the association between caregiver burden and sleep quality depended on PWD's limitations in activities of daily living (ADLs and IADLs) to represent the caregiver burden (Liu et al., 2017; McCurry et al., 2007). The current study found that the significant association between caregiving intensity and SMI was accounted for including RO in the model. Second, caregiver burden may undermine the foundations for sustained and enhanced mental health. Previous work found that caregiver burden was positively associated with the risk of affective disturbance which contributes to sleep disorder (Adams & Kisler, 2013; Liu et al., 2017; McCurry et al., 2007). Last, caregivers who feel RO may not have enough time to focus on their personal concerns (i.e., interacting with friends, keeping work–life balance, and self-care), thus leading to loneliness and social isolation which are related to decreased sleep quality (Jang et al., 2004; Kiely et al., 2000; Yang et al., 2019). The present findings suggest that interventions and caregiver supportive services that aim to improve sleep quality of dementia caregivers could be optimized by alleviating subjective burden.

Our findings suggest that among the four domains of social support, only IS was found to moderate the association between RO and SMI. IS measures caregivers' acceptance of help from friends and family on daily chores and caregiving tasks which can be defined as informal social support (Kaufman et al., 2010). Researchers have demonstrated the beneficial effects of informal social support on reducing caregiver burden and psychological distress (Thoits, 2011). Yet, we found that some did not distinguish between ES and IS (Shiba et al., 2016). The present finding for IS may be because receiving assistance on caregiving tasks directly reduces perceived burden, especially when caregivers are facing RO. Although ES is an important dimension of well-being of individuals, overloaded caregivers may not expect so much ES but someone who can assist with caregiving tasks. This may also explain the absence of association for aid finding support.

The association between RO and SMI is upheld for adult children caregivers when models were fitted within relationship type subgroups. Further, the protective effect of IS

is also only found in the adult children group. Research has shown that younger age is positively associated with self-reported depression and loneliness among caregivers (Musich et al., 2017). This may be because adult children often have their own family and career, so they often suffer from being “sandwiched” between two generations (Halinski et al., 2019). The social network of spousal caregivers is relatively simple, and they tend to think that it is their own responsibility to care for partners (Wang et al., 2014). Our data also confirm this, as the RO score reported by adult children is significantly higher than among spousal caregivers. However, it turns out that SU can buffer the negative effect of RO on SMI for spousal caregivers. This may be because spousal caregivers get little help from other unpaid caregivers. A report shows that nearly 80% of spousal caregivers are sole care providers (Public Policy Institute & AARP, 2015). Therefore, using supportive services, such as sharing care experiences in support groups and participating in community dementia care education programs, can help spousal caregivers solve care-related problems they face.

Contrary to our expectations, we found no effect of SE on the association between RO and SMI after controlling all covariates. The goal of SE was to maintain positive attitudes and accumulate social capital through participating in meaningful social activities (Fang et al., 2019). However, the analysis found a negative correlation between SE and RO (not presented here). This implies that overloaded caregivers may have less time for social participation and experience tension in their social roles. Thus, the hypothesized stress-buffering process of SE may not exist when caregivers feel RO.

In addition to caregiving-related factors, caregivers' own health conditions also challenge their sleep quality. The results of this study are consistent with prior studies that multimorbidities are a risk factor for sleep disturbance. The six physical and chronic conditions in the study, such as heart disease, hypertension, and diabetes, have all been found to be highly related to insomnia (Bolge et al., 2010; McCurry et al., 2007). Healthcare providers should pay attention to screening the caregiver's health status, and focus more on caregivers with various health conditions because they are more vulnerable to insomnia, which can lead to other health problems.

There are many treatments for sleep disorders, and the most direct one is to take medicine. Drugs can quickly and effectively improve sleep quality, but some clinical studies have reported symptoms such as decreased cognitive function, sleep apnea, and inattention after using psychotropic drugs to treat sleep disorders (Liguori, 2009; Shinohara & Yamada, 2012). Psychotherapy, such as cognitive behavioral therapy for insomnia, is also increasingly used (Rowe & Gross-King, 2015). For dementia caregivers, the most effective interventions must be able to meet their distinct needs. For example, adult children caregivers are more likely to report RO, and services that can provide direct care assistance (i.e., respite care) may be more effective. As for spousal caregivers, it would be better to participate in psychological education programs.

Limitations

Several limitations are worth noting. First, the cross-sectional data can only test the association between variables and cannot establish a causal relationship. We recognize that exhaustion from persistent sleep disruption can contribute to the subjective experience of RO. The causal association between RO and SMI is likely reciprocal, where the two phenomena are mutually reinforcing overtime. The present study provides evidence that the cycle can be interrupted through access to social coping resources. Longitudinal data are needed to strengthen the evidence. Second, relying on secondary data did not allow us to use more frequently utilized and validated measures of social support. However, the strengths of the study outweigh the limitations as the national dataset provides opportunities to explore the impact of caregiving on sleep quality through a caregiving stress process perspective.

Conclusion

This study revealed a significant relationship between dementia caregivers' subjective stress and sleep disturbance and documented the impact of social support and SE. Our findings imply that the high risk of sleep disturbance among dementia caregivers may be alleviated by reducing their perceived role tensions and providing IS for caregiving tasks. Our findings also suggest that spousal and adult children caregivers differently respond to the presence of different types of social support about caregiving and that these patterns may be affected by relationship type. While the risk of sleep problems in dementia caregivers is significant, few studies have focused on the circumstances of caregivers that may cause sleep disturbances and what to focus on in terms of caregiver education, support, and training. Future work is needed to enhance the understanding of the role of caregiving burden, social support, and sleep, which may suggest new pathways for the prevention of sleep disturbances and disorders in a population that is expected to grow significantly. Particularly, it may be beneficial for future studies to consider relationship type to specify intervention development.

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