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Caregiving-Related Sleep Problems and Their Relationship to Mental Health and Daytime Function in Female Veterans

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Abstract

Objective/Background—To identify caregiving-related sleep problems and their relationship to mental health and daytime function in female Veterans.

Participants—Female Veterans (N = 1,477) from cross-sectional, nationwide, postal survey data.

Methods—The survey respondent characteristics included demographics, comorbidity, physical activity, health, use of sleep medications, and history of sleep apnea. They self-identified caregiving-related sleep problems (i.e., those who had trouble sleeping because of caring for a sick adult, an infant/child, or other respondents). Patient Health Questionnaire (PHQ-4) was used to assess mental health, and daytime function was measured using 11 items of International Classification of Sleep Disorders-2 (ICSD-2).

Results—Female Veterans with self-identified sleep problems due to caring for a sick adult (n = 59) experienced significantly more symptoms of depression and anxiety ($p < 0.001$) and impairment in daytime function (e.g., fatigue, daytime sleepiness, loss of concentration, $p < 0.001$) than those with self-identified sleep problems due to caring for an infant or child (n = 95) or all other respondents (n = 1,323) after controlling for the respondent characteristics.

Conclusions—Healthcare providers should pay attention to assessing sleep characteristics of female Veterans with caregiving responsibilities, particularly those caregiving for a sick adult.

Female caregivers often report sleep problems including shorter total sleep time, delayed sleep onset, more nocturnal awakenings, and increased time awake after sleep onset than female noncaregivers (Willette-Murphy, Toder, & Yeaworth, 2006). Causes for sleep problems in female caregivers are multifactorial. They include age (McCurry, Logsdon, Teri, & Vitiello, 2007), race or ethnicity (Hall et al., 2009), marital status (Arber, 2012), employment status (Tworoger, Davis, Vitiello, Lentz, & McTiernan, 2005), disruptive demands of their caregiving responsibilities (Creese, Bedard, Brazil, & Chambers, 2008), menopause transition (Kravitz et al., 2008), stress, depression (Creese et al., 2008), and poor sleep hygiene (e.g., staying in bed for extended periods) or irregular sleep schedules (McCurry, Song, & Martin, 2015). Sleep problems among caregivers are associated with more depressive symptoms, higher levels of caregiver burden, lower daytime function (i.e., sleepiness and fatigue on daily activities), lower quality of life (Creese et al., 2008; Cupidi et al., 2012; McKibbin et al., 2005), more inflammation, and increased risk at cardiovascular disease (Mausbach et al., 2006; von Kanel et al., 2010).

Despite significant sleep problems in female caregivers, current knowledge on caregivers is limited to caregivers of adults. In general, caregivers who provide care to an adult are providing assistance with a wide range of caregiving tasks because of long-term physical conditions of adult care recipients, resulting in high burden or stress of the caregivers (National Alliance for Caregiving and AARP Public Policy Institute, 2015). Such conditions of the adult care recipients are likely to deteriorate over time and caregivers of adults are often the sole care providers. This is likely more burdensome than providing care to an infant or child and suggests that differences in sleep and health among caregivers of adults versus children are likely. Additionally, little is known about the relationships of caregiving, sleep, and health among female Veterans who are caregivers. This subgroup is particularly vulnerable to challenges. Female Veterans are at higher risk for poor health. They experience poorer mental health (Banerjee, Pogach, Smelson, & Sambamoorthi, 2009; Sambamoorthi, Bean-Mayberry, Findley, Yano, & Banerjee, 2010) and access less health care than male Veterans at Veterans Affairs (VA) facilities (Hamilton, Frayne, Cordasco, & Washington, 2013). They also show higher demands in reproductive health management (Callegari et al., 2016), higher rates of tobacco use (Bastian et al., 2016), more decline in physical function associated with chronic medical conditions (Gray et al., 2016), and higher mortality rates, compared to women in general population (LaCroix et al., 2016). One of the few studies of female Veteran caregivers (Lavela, Etingen, & Louise-Bender Pape, 2013) found that female Veteran caregivers were more likely to experience insufficient sleep (i.e., 14 days of not getting enough rest or sleep; Wheaton et al., 2011) and poor mental health compared to other female caregivers. Caregiving responsibility and related sleep problems might add additional risk to negative health outcomes, which may pose an additional barrier to seeking care and further delay assessment and treatment of important health concerns. Thus, investigating sleep patterns and the physical or mental health of female Veterans who are caregivers is important if one is to understand and be able to respond to their unique health care service needs.

As part of a national survey of sleep among female Veterans, this study aimed to investigate the associations among caregiving-related sleep problems, mental health, and sleep-related daytime dysfunction in female Veterans. Particularly, we focused on self-identified sleep problems due to caring for an adult versus a child, as this allowed us to identify potential differences in sleep problems and related health problems in female Veterans who provide care for different age groups of care recipients. We hypothesized that female Veterans who self-identified sleep problems due to caring for an adult would have poorer mental health (i.e., depression and anxiety) and more daytime dysfunction (e.g., fatigue, problems with concentration), compared to those who self-identified caregiving-related sleep problems due to caring for a child or infant, after adjusting for demographic factors, comorbidity, health status, use of sleep medication, and history of sleep apnea.

METHOD

This study used data gathered within a large nationwide cross-sectional postal survey of insomnia among female Veterans. The purpose of the original study was to establish the prevalence of insomnia among female Veterans who receive VA health care and to evaluate their treatment preferences. The survey consisted of validated screening instruments and

questions to address the diagnostic criteria for insomnia disorder (International Classification of Sleep Disorders [ICSD]; American Academy of Sleep Medicine, 2014), other sleep-related conditions, demographics, health-related factors, psychiatric comorbidities, psychosocial factors, and insomnia treatment preferences. For concepts where appropriate validated survey items were not available, we employed a “cognitive interviewing” process (Collins, 2003; Drennan, 2003) using a small pilot survey sample ($n = 100$ mailed; 32 respondents) to develop and refine selected survey items. Cognitive interviewing has been widely used in survey questionnaire design and is efficient when there is uncertainty regarding how respondents will answer questionnaires or doubt about their understanding of the question wording (Drennan, 2003). We contacted six survey respondents by phone, checked clarity of the selected items and answers, and revised questions on insomnia and comorbidity. We then further pilot tested those items by distributing the survey to 25 additional female Veterans. No concerns were noted. The outcomes of this process were presented to a Technical Advisory Panel, consisting of experts in sleep, women’s health, implementation science, and research dissemination in the VA. This process quickly resulted in a set of items that were well understood by respondents.

The finalized survey questionnaire was mailed in four batches of 1,000 surveys each from February through October, 2013. If a survey was not returned within three weeks, a second survey was mailed. To enhance the study respondent sample and minimize risk of nonresponse bias, all nonresponders from the first 1,000 mailed surveys were also contacted by telephone and invited to complete the survey.

Study Participants

Simple national random sampling was used to identify participants. Eligibility criteria included female Veterans who had received health care at a VA facility in the prior six months (total $n > 300,000$), based on information from the VA Health Eligibility Center. The short time frame was necessary because, in our prior work (Hughes, Jouldjian, Washington, Alessi, & Martin, 2013), invalid addresses were more common for Veterans who had not received care within the previous six months. The VA Health Eligibility Center provided us with a database that contained the names, addresses, and phone numbers of all female Veterans who met the inclusion criteria. Four thousand female Veterans with valid addresses were invited to return our survey in a preaddressed, postage-paid return envelope. The total response rate was 39%: 1,559 surveys were returned by mail or completed by telephone. Of the respondents, 1,477 individuals had complete (nonmissing) data for all of the variables necessary for current data analysis.

The study was approved by the Institutional Review Board of the VA Greater Los Angeles Healthcare System. A waiver of documentation of consent for survey respondents was obtained.

Study Variables

Respondent characteristics and covariates—Demographic characteristics included age, race, marital status, and employment status. Self-rated health data were obtained from the single item from the Short Form-12 Health Survey (Jenkinson et al., 1997) and scored as

excellent/very good, good/fair, or poor. A metric of comorbidity was adapted from three measures: (a) common diagnostic codes for female Veterans in the *International Classification of Diseases*, Ninth Revision (World Health Organization, 1977); (b) comorbidity index (Selim et al., 2004), and (c) medical conditions from the Study of Women's Health Across the Nation (Sowers et al., 2000). Ultimately, a list of 16 comorbid conditions (10 medical and 6 psychiatric) was finalized with the aid of the Technical Advisory Panel and included in the survey. The respondents were asked if they have or have ever been treated for each of the comorbid conditions. Here, we included the 10 medical conditions only, due to potential interactions between psychiatric conditions (e.g., depression, anxiety) and one of our dependent variables (i.e., PHQ-4, described below). The total number of the medical conditions the respondent endorsed was used in our analysis.

Physical activity ratings were adapted from the Leisure-Time Physical Activity Scale (Godin & Shephard, 1985). Total minutes of mild exercise (i.e., minimal increase in heart rate, minimal effort such as easy walking, gentle yoga, stretching, bowling, and golf) during the past seven days were used for the data analysis. Use of sleep medication (prescribed or over-the-counter) and diagnostic history of sleep apnea were assessed.

Independent variables—Information on sleep problems was collected by modifying items regarding reasons for trouble sleeping in the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). We asked respondents to “check” items that applied to them. Two items related to caregiving as reasons for having trouble sleeping were used for the current analysis. These items were (a) “During the past month, did you have trouble sleeping because of needing to care for a sick or disabled adult?” and (b) “During the past month, did you have trouble sleeping because of needing to care for an infant or child?” Three categories were created based on the two items: Group 1 (i.e., women who checked item a: trouble sleeping because of caring for a sick or disabled adult), Group 2 (i.e., women who checked item b: trouble sleeping because of caring for an infant or child), and Group 3 (i.e., women who did not check either item: no trouble sleeping due to caregiving, trouble sleeping due to other causes, no trouble sleeping, or not a caregiver). A small number of respondents ($n = 9$) reported both types of caregiving-related sleep problems, but this subgroup was too small for inclusion as a separate subgroup. We elected to drop them from the current analyses.

Dependent variables—We examined two dependent variables as separate outcomes. Depression and anxiety among female Veterans was assessed by the Patient Health Questionnaire (PHQ-4; Kroenke, Spitzer, Williams, & Lowe, 2009), which combined two 2-item validated scales: the PHQ-2 (Kroenke, Spitzer, & Williams, 2003) and the Generalized Anxiety Disorder scale (GAD)-2 (Kroenke, Spitzer, Williams, Monahan, & Lowe, 2007). The PHQ-2 assesses the two core criteria for depressive disorders and asks whether a patient has been “feeling down, depressed, or hopeless” and has “little interest or pleasure in doing things.” The GAD-2 includes the two core criteria for GAD, which are “feeling nervous, anxious, or on edge” and “not being able to stop or control worrying.” The PHQ-4 assesses frequency of symptoms over the past two weeks on a 0–3 scale: from 0 = not at all to 3 = nearly every day. Total scores range from 0 to 12; higher scores indicate more anxiety and

depression. Construct validity has been established (Kroenke et al., 2009) by strong correlations with mental health on the 20-Item Short Form Health Survey (Stewart, Hays, & Ware, 1988).

Daytime dysfunction was measured using items derived from the daytime consequences of insomnia listed in the ICSD-2 (American Academy of Sleep Medicine, 2014). Validated instruments for measuring this criterion do not exist. Thus, items were formatted for our survey study purposes. Eleven daytime impairments resulting from poor sleep during the past month assessed with the following forms: fatigue and sleepiness, mood disturbances and cognitive difficulties, quality of life, and exacerbation of comorbid conditions. The total number of reported sleep-related daytime impairments was used as a dependent variable. Scores ranged from 0 to 11; higher scores indicate more impairment.

Data Analysis

Descriptive statistics were calculated for all respondent characteristics (i.e., means and standard deviations [*SDs*] for continuous variables; frequencies for categorical variables). These descriptive statistics were computed for the overall sample and for each level of the independent variable (i.e., Groups 1, 2, and 3). The characteristics of respondents were compared across the three levels of the independent variable using analysis of variance (ANOVA) for continuous variables and chi-square tests for categorical variables. Assumptions for ANOVA were assessed and met.

Analysis of covariance (ANCOVA) was used to test differences among the levels of the independent variable (in terms of the dependent variable) after adjusting for covariates. Covariates were selected prior to analyses based on prior research showing a relationship between the covariate and sleep in female caregivers in the general population (see introductory section). Assumptions of ANCOVA were tested and met. We fit an ANCOVA model for each dependent variable including the independent variable as a predictor and covariates described above (i.e., age, race [white versus others, black versus others], marital status, employment status, self-rated health, comorbidity, physical activity, use of sleep medication, and history of sleep apnea). Adjusted means were computed with 95% confidence intervals (CIs) for each level of the independent variable showing differences among groups after accounting for the contribution of all covariates. Planned pairwise tests were used to compare each possible pair of groups on the dependent variables (three total comparisons).

For all statistical tests, $p < 0.05$ was considered statistically significant (no adjustments were made as a total of only six tests were performed). Analyses were performed using Stata statistical software (version 13, Stata Corporation, College Station, TX).

RESULTS

Respondent Characteristics

The mean age of study respondents was 51.8 years ($SD = 14.5$) and ranged from 18 to 100. Fifty-nine respondents (4.0%) reported that they had trouble sleeping because of needing to care for a sick or disabled adult; 95 respondents (6.4%) had trouble sleeping because of

needing to care for an infant or child. Overall, the mean PHQ-4 score was 4.1 ± 3.7 (range 0–12) and the average number of impairments in daytime function was 5.8 ± 3.0 (range 0–10). Table 1 shows respondent characteristics by the three levels of the independent variable. Respondents with self-identified sleep problems due to caring for an infant or child were more likely to be married and were less likely to report use of sleep medication than the other groups.

Associations Between Self-Identified Caregiving-Related Sleep Problems, Mental Health, and Daytime Function

Table 2 shows the results of the ANCOVA for each dependent variable, presenting the results of the planned pairwise tests among the three levels of the independent variable as well as the adjusted means among the levels of the independent variable.

The planned pairwise tests showed that mental health was significantly worse for Group 1 as compared to Group 2 and Group 3. Female Veterans who self-identified sleep problems due to caring for an adult had significantly higher mental health scores (Group 1; mean = 5.0, 95% CI = 4.2–5.9) than Veterans in sleep problems due to caring for a child (Group 2; mean = 3.9, 95% CI = 3.2–4.6). Female Veterans in Group 1 also had significantly higher mental health scores than Veterans who self-identified sleep problems due to other reasons or had no sleep problems regardless of their caregiving situation (Group 3; mean = 4.0, 95% CI = 3.9–4.2).

The planned pairwise tests showed that daytime function was significantly worse for Group 1 as compared to Group 2 and Group 3. Female Veterans with self-identified sleep problems due to caring for an adult had significantly more impairment in daytime function (Group 1; mean = 6.5, 95% CI = 5.9–7.1) than women with sleep problems due to caring for an infant or child (Group 2; mean = 5.7, 95% CI = 5.2–6.2) or the other respondent group (Group 3; mean = 5.8, 95% CI = 5.6–5.9).

No significant differences were found in the comparison between Group 2 (respondents with self-identified sleep problems due to caring for an infant or child) and Group 3 (the other respondents) for either of the dependent variables (i.e., mental health or daytime function).

DISCUSSION

Our study found that female Veterans who self-identified sleep problems due to caring for sick adults experienced significantly more symptoms of anxiety and depression and greater impairment in daytime function than those who self-identified caregiving related sleep problems due to caring for an infant or child or all other respondents after adjusting for age, race, marital status, employment status, self-rated health, comorbidity, physical activity, use of sleep medication, and history of sleep apnea. This suggests that self-identified adult caregiving-related sleep problems has an independent effect on health and well-being among female Veterans.

In addition to a previous study (Lavela et al., 2013) reporting higher rates of self-reported sleep problems and poorer mental health in female Veteran caregivers compared to female

non-Veteran caregivers, our findings present new evidence on the relationship between caregiving-related sleep problems and mental health as well as daytime impairments in female Veterans, particularly those who self-identified the sleep problems due to caring for a sick adult versus a child or infant. A possible reason for this difference might be the positive rewards of caregiving for a healthy child or infant (Monin, Levy, & Pietrzak, 2014).

This finding could also apply to caregivers in the general population who provide care for a sick adult since the caregiving activities themselves are likely similar. It is difficult to compare the nature of caregiving for a child, which may be viewed as a normal undertaking chosen by some women, to caregiving for a sick adult, and there is essentially no literature comparing these two groups of caregivers. The latter may be viewed as an unexpected and unchosen set of circumstances. Unfortunately, evidence of actual caregiving tasks for women with children as a predictor of sleep loss is lacking, although studies show poor sleep of women during the postpartum period (Lee, Zaffke, & McEnany, 2000). This is likely due, in part, to daily caregiving tasks associated with caring for an infant. To our knowledge this is the first study comparing the two caregiving scenarios in terms of sleep.

One strength of our study was its large, randomly selected, national sample of female Veterans from across the United States. To our knowledge, this study is the first of its kind to explore the relationship between self-identified caregiving-related sleep problems in female Veterans as well as mental health and daytime function. The acceptable response rate (39%) for a mailed survey adds credence to the results reported here.

This study also has some limitations. Sample sizes of some subgroups were relatively small; however, this is partially mitigated by the representative sampling used for the larger national survey study. Because of our survey study's original purpose, the survey questionnaire did not include more detailed information about caregiving characteristics such as whether caregivers were informal or paid, the duration and frequency of caregiving, types of caregiving activities, nor did it distinguish between caregivers of aging parents with physical or cognitive impairment, versus caregivers of spouses with illness or injury, who might themselves be Veterans. In addition, because we did not provide a definition for the term *caregiver* in our survey, respondents may have interpreted it in multiple ways. It was not feasible to include the level of descriptive detail (e.g., whether caregivers were involved in specific caregiving tasks such as activities of daily living) in the postal survey; however, our cognitive interviewing process suggested women understood the intent of the item. We also were not able to use all items from the PSQI in our survey, limiting our ability to compare our results to studies using the full PSQI.

In this analysis, we assessed caregiving-related sleep problems as a dichotomous variable (yes/no), measuring only whether respondents had trouble sleeping or not. We do not know what type of sleep problems they had (e.g., trouble falling or staying asleep) and whether other factors contributed (e.g., worry). Future studies should include types of sleep problems (e.g., short sleep time, nocturnal awakenings) and types of caregiving activities. This would give health care providers and organizations who provide care for female Veterans a deeper insight into their sleep problems and the kinds of services needed to best address them.

Additionally, we do not know about whether the act of caregiving itself is more likely to be associated with sleep problems in female Veterans, or whether there are differences between those who are caregivers and self-identify as having sleep problems related to it, and those who do not report sleep problems, but still provide care to a sick adult. Thus, the interpretation of our finding as they relate to caregiving itself, mental health, and sleep problems is difficult. Nonetheless, these findings are relevant to clinicians who work with female Veterans, for example, in caregiver support groups. Those who experience poor sleep while caring for an adult may be at elevated risk for poor mental health and impairments in daytime function.

Our measure for assessing daytime impairment has not been psychometrically validated or compared to other measures of daytime sleep-related impairments. The items were directly derived from the ICSD-2 indications for daytime consequences of insomnia disorder, and our pilot testing demonstrated the face validity of the items. Lastly, the cross-section study design does not allow us to demonstrate causal relationships between caregiving-related sleep difficulties and our outcomes.

In summary, female Veterans who have caregiving responsibility for a sick adult may need education, resources, and treatment when they experience sleep problem. It is important to assess sleep characteristics of this group with caregiving responsibilities in both clinical settings and in future studies. Understanding potential sleep-protective factors by including caregivers who sleep well will also further inform this line of investigation.

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TABLE 1

Respondent Characteristics by Types of Caregiving Causing Sleep Problems

Variable	Overall (n = 1,477)	Group 1 (n = 59)	Group 2 (n = 95)	Group 3 (n = 1,323)	p value
Age (years), mean (SD)	51.8 (14.5)	54.0 (9.9) [‡]	36.2 (9.5)	52.8 (14.3)	< 0.001
Race					
White	59.2% (875)	66.1% (39)	62.1% (59)	58.7% (777)	0.446
Black	23.7% (350)	20.3% (12)	18.9% (18)	24.2% (320)	0.421
Married	41.6% (614)	45.8% (27)	56.8% (54)	40.3% (533)	0.005
Employed	12.8% (189)	15.3% (9)	17.9% (17)	12.3% (163)	0.246
Self-rated health					0.106
Poor	6.7% (99)	5.1% (3)	2.1% (2)	7.1% (94)	
Good/Fair	63.9% (944)	74.6% (44)	62.1% (59)	63.6% (841)	
Excellent/Very good	29.4% (434)	20.3% (12)	35.8% (34)	29.3% (388)	
Comorbidity, mean (SD)	2.8 (1.9)	3.2 (2.0) [‡]	2.1 (1.7)	2.8 (1.9)	< 0.001
Mild physical activity (minutes), mean (SD)	161.6 (402.3)	185.1 (399.8)	184.6 (434.9)	158.9 (400.2)	0.751
Use of sleep medication	50.9% (752)	55.9% (33)	34.7% (33)	51.9% (686)	0.004
History of sleep apnea	13.4% (198)	11.9% (7)	3.2% (3)	14.2% (188)	0.009
Mental health,* mean (SD)	4.1 (3.7)	5.3 (3.9) [‡]	4.1 (3.6)	4.0 (3.7)	0.044
Daytime function,** mean (SD)	5.8 (3.0)	6.7 (2.9) [‡]	6.1 (2.8)	5.7 (3.0)	0.026

Note. Group 1 (trouble sleeping because of needing to care for a sick or disabled adult), Group 2 (trouble sleeping because of needing to care for an infant or child), and Group 3 (all other respondents, i.e., no trouble sleeping due to caregiving, trouble sleeping due to other causes, no trouble sleeping, or not a caregiver).

[‡] $p < 0.01$ compared with group 2;

[‡] $p < 0.05$ compared with group 3.

* Measured with PHQ-4 (range 0–12); higher scores indicate greater anxiety or depression.

** Measured with 11-item scale (range 0–11); higher scores indicate worse function or more impairment.

TABLE 2**Adjusted Mental Health and Daytime Function by Types of Caregiving Causing Sleep Problems**

	Group 1 (n = 59)	Group 2 (n = 95)	Group 3 (n = 1,323)	p value
Mental health *	5.0 ^{†‡} (4.2, 5.9)	3.9 (3.2, 4.6)	4.0 (3.9, 4.2)	< 0.001
Daytime function **	6.5 ^{†‡} (5.9, 7.1)	5.7 (5.2, 6.2)	5.8 (5.6, 5.9)	< 0.001

Note. Group 1 (trouble sleeping because of needing to care for a sick or disabled adult), Group 2 (trouble sleeping because of needing to care for an infant or child), and Group 3 (all other respondents, i.e., no trouble sleeping due to caregiving, trouble sleeping due to other causes, no trouble sleeping, or not a caregiver).

A model adjusted for age, race (white versus others, black versus others), marital status, employment status, self-rated health, comorbidity, physical activity, use of sleep medication, and history of sleep apnea.

[†] $p < 0.05$ compared with group 2;

[‡] $p < 0.05$ compared with group 3.

* Measured with PHQ-4 (range 0–12); higher scores indicate greater anxiety or depression.

** Measured with 11-item scale (range 0–11); higher scores indicate worse function or more impairment.

Note. Numbers in parentheses are 95% CI for adjusted means.