

Relationship between social support and sleep of elderly caregivers in social vulnerability

Relação entre apoio social e sono de pessoas idosas cuidadoras em vulnerabilidade social Relación entre apoyo social y sueño de adultos mayores cuidadores con vulnerabilidad social

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ABSTRACT

Objective: to analyze the relationship between social support and sleep quality of elderly individuals who care for other elderly individuals in a socially vulnerable environment. **Method:** a cross-sectional study conducted with 65 caregivers interviewed using a characterization instrument, Katz Index, Lawton and Brody Scale, Pittsburgh Sleep Quality Index, and Medical Outcomes Study Social Support Scale, with data analyzed using comparison and correlation tests. **Results:** the majority were women, spouses of the elderly being cared for, and had poor sleep quality. A weak and inverse correlation was observed between poor sleep quality and the positive social interaction dimension (Rho=-0.27; p=0.028). Significant relationships were identified between: material support and daytime dysfunction (p=0.034); emotional support and sleep efficiency (p=0.026); positive social interaction and subjective sleep quality (p=0.001), as well as daytime dysfunction (p=0.008). **Conclusion:** The higher the positive social interaction, the better the sleep quality.

Descriptors: Social Support; Caregivers; Aged; Sleep; Social Vulnerability.

RESUMO

Objetivo: analisar a relação entre apoio social e qualidade do sono de pessoas idosas que cuidam de outros idosos em ambiente de vulnerabilidade social. **Método:** estudo transversal realizado com 65 cuidadores entrevistados por meio de instrumento de caracterização, Índice de Katz, Escala de Lawton e Brody, Índice de Qualidade do Sono de Pittsburgh e Escala de Apoio Social do *Medical Outcomes Study*, com dados analisados com testes de comparação e de correlação. **Resultados:** a maioria eram mulheres, cônjuges do idoso cuidado e possuíam sono de má qualidade. Observou-se correlação fraca e inversa entre má qualidade do sono e a dimensão interação social positiva (Rho=-0,27; p=0,028). Identificou-se relação significativa entre: apoio material e disfunção diurna (p=0,034); apoio afetivo e eficiência do sono (p=0,026); interação social positiva, melhor é a qualidade do sono.

Descritores: Apoio Social; Cuidadores; Idoso; Sono; Vulnerabilidade Social.

RESUMEN

Objetivo: analizar la relación entre el apoyo social y la calidad del sueño de personas mayores que cuidan de otras personas mayores en entornos socialmente vulnerables. **Método**: estudio transversal realizado con 65 cuidadores entrevistados mediante un instrumento de caracterización, Índice de Katz, Escala de Lawton y Brody, Índice de Calidad del Sueño de Pittsburgh y Escala de Apoyo Social del *Medical Outcomes Study*, los datos fueron analizados mediante pruebas de comparación y correlación. **Resultados:** la mayoría eran mujeres, cónyuges del adulto mayor que recibe el cuidado y tenían mala calidad del sueño. Se observó una correlación débil e inversa entre la mala calidad del sueño y la dimensión de interacción social positiva (Rho=-0,27; p=0,028). Se identificó que había relación significativa entre: apoyo material y disfunción diurna (p=0,034); apoyo afectivo y eficiencia del sueño (p=0,026); interacción social positiva y calidad subjetiva del sueño (p=0,001) y disfunción diurna (p=0,008). **Conclusión:** Cuanto mayor sea la interacción social positiva, mejor será la calidad del sueño.

Descriptores: Apoyo Social; Cuidadores; Anciano; Sueño; Vulnerabilidad Social.

INTRODUCTION

The process of human aging is characterized by gradual losses of functionality, as well as social and psychological changes. Such changes can lead to increasing vulnerability and greater dependence within the family context. Additionally, the prevalence of chronic diseases among the elderly can contribute to the emergence of disability, necessitating the presence of a caregiver to assist the dependent elderly in their daily activities¹.

Currently, care provided to elderly individuals is primarily carried out by a family member who, not infrequently, is also an elderly person themselves^{1,2}. In the Brazilian context, it is common for the responsibility of caring for the dependent elderly to fall upon the spouse. The fact that elderly individuals are responsible for caring for other elderly

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individuals portrays an important issue, as these individuals, even if they maintain functionality, are prone to chronic diseases, cognitive changes, visual impairments, and difficulties in understanding therapeutic regimens. This fact can compromise the quality of care provided and, consequently, the health and well-being of both the caregiver and the care recipient¹⁻³.

For elderly caregivers to provide high-quality care, it is essential that they are both physically and cognitively well². However, it is known that elderly caregivers in contexts of high social vulnerability are more susceptible to multimorbidities³. Socially vulnerable environments are characterized by the absence, scarcity, or inadequacy of financial, social, cultural, and political resources for individuals - which hinders the exercise of individuals' social rights, affecting social cohesion and the ability to respond to adversities⁴. Furthermore, complaints related to sleep are frequently reported among elderly individuals⁵.

Researchers point out that lack of social support can exacerbate health problems, including sleep disorders. The literature describes that a good perception of social support is associated with good-quality nocturnal sleep⁶. The Stress Theory by John Cassel (1976) served as the theoretical framework for addressing social support in the present study. TThe theory proposes an explanation for the relationship between social support and health, arguing that stressful social relationships increase susceptibility to adverse conditions⁷.

A study conducted in Japan with 3,732 participants aimed to investigate factors associated with sleep disorders in community-dwelling elderly individuals. It identified that those who did not receive support from their spouse or family had 1.44 times higher odds of developing sleep disorders compared to those with sufficient support. The researchers concluded that sleep is closely linked to the social support provided by spouses and family members⁸. A longitudinal study conducted in the United Kingdom, which followed 2,446 individuals for 15 years, demonstrated that insufficient or inadequate social support was associated with poor sleep quality⁹. Corroborating this, another longitudinal investigation conducted in Singapore, with 1,417 individuals aged 60 and above, inferred that weaker social networks were associated with restless sleep¹⁰.

Although there is evidence that a lack of social support predicts poor sleep among elderly individuals¹¹⁻¹³, when it comes to elderly caregivers, no studies have been identified in the literature, making it difficult to recognize the specificities in this population. Furthermore, the absence of studies limits the generalization of data and the identification of common factors across various caregiving contexts that may impact physical and mental health.

In light of this, the existence of a relationship between social support and sleep quality in elderly caregivers in contexts of high social vulnerability is questioned. Understanding this relationship is relevant, reflecting the pursuit of comprehensive care, considering that the health, quality of life, and well-being of these individuals may be compromised in the face of a lack of social support and sleep problems.

The present study aimed to analyze the relationship between social support and sleep quality of elderly individuals who care for other elderly individuals in a socially vulnerable environment.

METHOD

This is a quantitative study with a cross-sectional design, following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist, which used data from the research "Factors associated with poor sleep quality among elderly caregivers," conducted in the municipality of São Carlos, São Paulo, Brazil.

The inclusion criteria were: being aged 60 years or older, being the primary caregiver of a dependent elderly individual, being an informal caregiver, residing in the same household as the elderly individual receiving care, and being registered in a Family Health Unit (FHU) located in a context of high social vulnerability. The established exclusion criteria were: presenting communication difficulties due to severe hearing and/or visual impairments, both elderly individuals classified as independent in both basic and instrumental activities of daily living, as identified by the interviewer at the time of data collection.

The dependent elderly individual was identified by their difficulty in performing at least one basic or instrumental activity of daily living, assessed through the Katz Index and the Lawton and Brody Scale.

The Index of Social Vulnerability for São Paulo (IPVS) was used to identify Family Health Units (FHUs) located in contexts of high social vulnerability. The IPVS is an index composed of demographic and socioeconomic aspects of residents in the state of São Paulo, categorizing geographical regions into seven levels of social vulnerability: very low social vulnerability; low social vulnerability; moderate social vulnerability; high social vulnerability; very high social vulnerability; and high social vulnerability (rural areas)¹⁴. For eligibility criteria for vulnerable regions, Family Health Units (FHUs) located in contexts of high social vulnerability (IPVS = 5) were selected.



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After identifying the FHUs located in contexts of high social vulnerability, a list of households with at least two elderly individuals was provided by healthcare professionals. Considering a population of 177 elderly caregivers of elderly individuals, a prevalence of sleep disorders in the elderly of 44.9%¹⁵, a confidence level of 95%, and a margin of error of 6%, the sample calculated through the Prática Clínica® platform¹⁶ was 59 elderly caregivers. Out of the 177 registered elderly individuals, 112 were excluded (three deaths; 15 changes of address; 50 refusals to participate; 36 elderly individuals not located after three attempts of home visits; and eight incomplete interviews), resulting in a final sample of 65 elderly caregivers.

All ethical aspects of Resolution 466/12 of the National Health Council were respected. The project was authorized by the Municipal Health Department of São Carlos and approved by the Research Ethics Committee of the institution, and all participants signed the Informed Consent Form (ICF).

Data collection was conducted from July 2019 to March 2020 through home interviews conducted by eight previously trained undergraduate and graduate students. Initially, contact was made with the five Family Health Units (FHUs) located in contexts of high social vulnerability in order to identify households with potential participants. Subsequently, home visits were conducted for all elderly caregivers to verify compliance with the inclusion and exclusion criteria. Upon confirming the inclusion criteria, they were invited to participate. In case of acceptance, a new visit was scheduled to conduct the interview.

The interview took place in a reserved space within the elderly individuals' residence, individually, and lasted approximately two hours. A questionnaire developed by the researchers was used.

The sociodemographic and health characterization variables of the sample were: gender (female or male), age (in years), education (in years), marital status (with or without partner), extrahousehold work (yes or no), family and individual income (in BRL), retirement (yes or no), family arrangement (with whom they live), number of people living in the house, multimorbidity (yes or no), number of medications in use (none, one, two or more), pain (yes or no), physical activity (yes or no), alcohol consumption (yes or no), smoking (yes or no), private health insurance (yes or no), degree of kinship (spouse, parent, parent-in-law, sibling, other), number of hours and days per week dedicated to caregiving, how long they have been providing care (in years), whether they have taken any caregiver training course (yes or no), and whether they receive help with caregiving tasks (yes or no).

Functional capacity regarding activities of daily living (ADLs) was assessed using the Katz Index. This scale was translated and validated for use in the Brazilian context and consists of six items that allow analyzing the degree of dependence of the elderly person regarding bathing, dressing, using the toilet, transferring, maintaining continence, and feeding. At the end, it is possible to verify how many activities the elderly person is dependent on for ADLs. The scores range from zero to six points, with higher scores indicating greater dependence^{17,18}.

Functional capacity in instrumental activities of daily living (IADLs) was assessed using the Lawton and Brody Scale, which evaluates the degree of independence in using transportation, using the telephone, preparing meals, shopping, doing household chores, managing medication, and handling money. This scale has been validated and translated for use in Brazilian elderly individuals. The scores obtained from the instrument range to a final score that can vary between 7 and 21 points, with higher scores indicating greater independence (seven points signify total dependence; from eight to 20 points, partial dependence; and 21 points, independence)^{19,20}.

To assess sleep quality, the Pittsburgh Sleep Quality Index was used²¹. It is a translated and validated instrument for use with the Brazilian population, consisting of seven dimensions comprising 19 questions. The dimensions are: subjective sleep quality, sleep duration, sleep latency, sleep disturbances, habitual sleep efficiency, use of sleep medication, and daytime dysfunction due to sleepiness. The total score ranges from zero to 21, with higher scores indicating poorer sleep quality. Sleep quality can be categorized as follows: good quality sleep (zero to four points), poor quality sleep (five to ten points), and presence of sleep disturbances (11 to 21 points)^{21,22}.

Social support was assessed using the Medical Outcomes Study (MOS) Social Support Scale^{23,24}, which evaluates the frequency of perceived social support. It consists of 19 items divided into the following dimensions: material support (four items); emotional support (three items); positive social interaction (four items); emotional support (four items). The standardized scores for each of the five dimensions of social support are calculated by assigning points to each response option (1 - never; 2 - rarely; 3 - sometimes; 4 - often; 5 - always). For example, in the material support dimension, consisting of 4 items, if an interviewee responded "always" to two items and "often" to the other two items, their total points would be 18. The total points obtained by the respondent in this dimension were divided by 20 (the maximum number of points in this dimension) and multiplied by 100 to standardize the results of all dimensions because they were composed of different numbers of items. Thus,



a score was obtained for each of the five dimensions that can range from 20 to 100 points, with higher scores indicating higher levels of social support. This instrument was also translated and validated for use in the Brazilian context^{24,25}.

The normality of the variables was tested using the Kolmogorov-Smirnov test. In the descriptive analysis of the data, frequency distributions, medians, and 25th and 75th percentiles (p25 - p75) were estimated for the numerical variables of the study. For categorical variables, prevalences were estimated. To identify differences between groups, the Mann-Whitney and Kruskal-Wallis tests were used. Considering the non-parametric distribution, Spearman's rank correlation test was used to analyze the correlation between the sleep quality score and the dimensions of social support. The magnitude of the correlation was classified as weak (<0.3); moderate (0.3 to 0.59); strong (0.6 to 0.9); and perfect (1.0)²⁶. The significance level of 5% was adopted. The data obtained were coded and entered by two separate data entry clerks into a spreadsheet and analyzed with the support of the Stata® statistical package, version 13.

RESULTS

The sample of this study consisted of 65 elderly caregivers. Table 1 presents the sociodemographic and health characteristics of the participating elderly caregivers.

Variables		n (%)	median (p25 - p75)
Gender	Male	28 (43.1)	
	Female	37 (56.9)	
Age (years old)			69 (64 - 73)
Marital status	With a partner	61 (93.9)	
	Without a partner	4 (6.1)	
Years of study			3 (1 - 4)
Personal income			998.00 (998.00 - 1,500.00)
Family income			2,090.00 (1,996.00 - 3,000.00
Multimorbidity	Yes	62 (95.4)	
	No	3 (4.6)	
Use of medications	Two or more	47 (72.3)	
	One	10 (15.4)	
	None	8 (12.3)	
Pain	Yes	59 (90.8)	
	No	6 (9.2)	
Sleep quality	Bad	33 (50.8)	
	Good	17 (26.1)	
	Sleep disorders	15 (23.1)	
Total score of sleep quality			7 (4 - 19)
ADLs	Independence	48 (73.9)	
	Dependency in one activity	16 (24.6)	
	Dependency in two activities	1 (1.5)	
IADLs	Partial dependence	41 (63.1)	
	Independence	24 (36.9)	
Recipient of care	Spouse	58 (89.3)	
	Parent	3 (4.6)	
	Parent-in-law	1 (1.5)	
	Sibling	1 (1.5)	
	Other	2 (3.1)	
Duration of caregiving (years)			5 (2 - 17.5)
Daily caregiving hours			24 (10 - 24)
Weekly caregiving days			7 (5 - 7)
Weekly caregiving days	No	63 (96.9)	
	Yes	2 (3.1)	
Receives help in caregiving	No	38 (58.5)	
	Yes	27 (41.5)	

Table 1: Distribution of elderly caregivers of other elderly individuals in a context of high social vulnerability according to sociodemographic, health aspects, and caregiving characteristics (n=65). São Carlos, SP, Brazil, 2019-2020.

Key: ADLs - Activities of Daily Living; IADLs - Instrumental Activities of Daily Living; p25 - 25th percentile; p75 - 75th percentile.





There was a predominance of women who were caring for their spouses, with multimorbidity, using two or more medications, self-reporting chronic pain, and with poor sleep quality.

Regarding the total score of the social support scale, the median for each domain was: material support (90); emotional support (100); positive social interaction (80); emotional support (85); and informational support (85). Table 2 demonstrates the correlation between sleep quality and the dimensions of social support.

Table 2 - Spearman's correlation between sleep qualityand dimensions of social support (n=65). São Carlos, SP,Brazil, 2019-2020.								
	Sleep	Sleep quality						
	Rho	р						
Material support	-0.22	0.081						
Emotional support	0.01	0.930						
Emotional support	-0.09	0.433						

Informational support -0.24 0.054 Positive social interaction -0.27 0.028

A weak, inverse correlation was observed between sleep quality and the dimension "positive social interaction" (Rho= -0.27; p=0.028). This means that the higher the score obtained in this dimension of social support, the lower the score on the instrument that evaluates sleep quality.

Table 3 presents the median scores of social support dimensions according to sleep characteristics.

Table 3: Median score and p-values of the Mann-Whitney and Kruskal-Wallis tests conducted between the dimensions of social support and sleep characteristics (n=65). São Carlos, SP, Brazil, 2019-2020.

	Material	l p	Affective	p	Emotional	p	Information		Social	
								р	Int.	р
Sleep quality*										
Good	90.0	0.671 ¹	100.0	0.336 ¹	85.0	0.988 ¹	90.0	0.565 ¹	85.0	0.094 ¹
Bad	90.0		93.3		85.0		80.0		85.0	
Sleep disturbance	85.0		100.0		90.0		75.0		70.0	
Subjective Sleep Quality										
Good	90.0	0.134 ²	100.0	0.512 ²	85.0	0.077 ²	85.0	0.478 ²	85.0	0.001 ²
Bad	82.5		100.0		70.0		75.0		62.5	
Sleep latency										
Short	90.0	0.167 ²	100.0	0.536 ²	85.0	0.141 ²	87.5	0.211 ²	82.5	0.051 ²
Long	85.0		93.3		65.0		80.0		60.0	
Sleep duration										
Recommend	90.0	0.656 ²	100.0	0.590 ²	85.0	0.840 ²	90.0	0.237 ²	80.0	0.242 ²
Does not recommend	87.5		100.0		85.0		80.0		72.5	
Sleep efficiency										
Efficient	90.0	0.728 ²	86.6	0.026 ²	80.0	0.190 ²	85.0	0.739 ²	75.0	0.508 ²
Inefficient	85.0		100.0		90.0		85.0		80.0	
Medication use										
Null/Rarely	90.0	0.185 ²	100.0	0.372 ²	85.0	0.471 ²	85.0	0.359 ²	80.0	0.694 ²
Very often	80.0		90.0		85.0		77.5		75.0	
Daytime dysfunction										
Low indisposition	90.0	0.034 ²	100.0	0.164 ²	85.0	0.108 ²	85.0	0.058 ²	85.0	0.008 ²
High indisposition	77.5		90.0		77.5		75.0		62.5	

Notes: *total score; Social Int. = Positive Social Interaction; 1 = Kruskal-Wallis test; 2 = Mann-Whitney test.

Statistically significant results were identified between: material support and daytime dysfunction (p=0.034); emotional support and sleep efficiency (p=0.026); positive social interaction and subjective sleep quality (p=0.001), as well as daytime dysfunction (p=0.008).



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DISCUSSION

Regarding sleep quality, there was a predominance of elderly caregivers who reported poor sleep quality. The nighttime sleep disruption among caregivers may be related to the daily intensity and long duration of caregiving²⁷⁻²⁹. Considering that the caregivers evaluated in the present study had been performing caregiving tasks for many years, for several hours a day, and without support from others, the observed sleep disturbance may be related to caregiving-related issues. Sleep dissatisfaction can lead to irritability, lack of motivation, reduced concentration, and clarity in decision-making²⁸, which can negatively impact the care provided and the caregiver's health-related quality of life.

The nighttime sleep disruption experienced by these elderly caregivers should be analyzed from the perspective of the social vulnerability they are exposed to. Given the limited social, economic, and access to goods and services resources, these individuals are susceptible to the risk of illness and health-related harm³⁰.

In addition to that, there are physiological changes related to the quality and quantity of nighttime sleep that occur during the aging process. These include reduced endogenous secretion of melatonin, increased occurrence of transitions between sleep stages and wakefulness, shorter duration of deep sleep, longer sleep onset latency, disruption of the circadian rhythm, and impairment of sensory organs capable of recognizing temporal cues.³¹. In this sense, there may be a higher prevalence of poor sleep quality.

Regarding the social support network of elderly caregivers, the literature demonstrates that those who have an adequate and active social network benefit not only from having social resources available but also from being able to contribute to and support others³². It is noted that, regardless of quantitative variations in the composition of elderly individuals' networks, the level of importance is primarily determined by the quality of the support received³³.

In relation to social support, the highest score was obtained in the affective dimension, and the lowest score was in the positive social interaction dimension. However, high levels of social support were found in all dimensions. Studies conducted with non-caregiving older adults^{34,35} and with older adult caregivers³⁶ have also found similar findings.

In the present study, emotional support had a higher score due to the displays of affection, love, and care being more easily noticed, especially when considering the context and life stage they are in³⁴. It was also identified that participants with little daytime indisposition showed higher scores of material support. The literature suggests that when elderly individuals receive the material support they need, they feel calm, supported, and sleep better³⁴, being more disposed to carry out activities the following day.

Regarding positive social interaction, the scores were low, possibly justified by the care provided during long shifts, for several hours and days of the week, resulting in reduced time for socializing with others^{34,35}. Uninterrupted activities are associated with social isolation, as caregivers not only provide care but also require time for household chores³⁵.

It is noteworthy that the elderly caregivers participating in the study are situated within a context of adverse circumstances and limited resources. Therefore, social support can be seen as a subsidy related to resilience. The literature indicates that perceiving the availability of social support allows individuals to have a positive outlook on life and adversities, serving as a coping strategy for stressful situations^{35,36}.

Social relationships based on reciprocity and trust can help regulate emotions and cope with stress, consequently producing positive effects on nighttime sleep. The feeling of belonging and appreciation, as well as sharing experiences, can also improve mood, resulting in satisfactory sleep. In this sense, depression can be considered an important mediator between social support and sleep quality, as depressed individuals tend to have low social engagement and complaints related to sleep^{9,13}.

A correlation was observed between sleep quality and the "positive social interaction" dimension: the higher the score obtained in this dimension of social support, the lower the score on the instrument assessing sleep quality. Furthermore, it was identified that elderly caregivers with good quality sleep and little daytime drowsiness had higher scores on positive social interaction. A Chilean study identified convergent results as well²⁵. Thus, it became evident that greater social involvement is related to better sleep quality^{9,34}. Social interaction can be beneficial for sleep quality.

The Stress Theory, as mentioned in the introduction, suggests that the quality of social relationships influences an individual's health conditions⁷. Therefore, friendly social relationships can generate satisfactory perceived support and function as protective factors for health in old age³¹. Therefore, friendly social relationships can generate satisfactory perceived support and function as protective factors for health in old age² Therefore, interventions based



on various components can be planned by nurses and multidisciplinary teams to propose strategies to prevent social isolation and improve people's sleep quality, such as physical activity groups, cognitive stimulation, and self-care encouragement³⁴.

In the present investigation, positive aspects regarding sleep characteristics are associated with higher scores of social support. Scholars suggest that being close to other people provides security against potential adversities. Belonging to a social support network provides tranquility for elderly individuals in the sense of having someone to rely on for the resolution of routine problems. They also argue that life changes can generate anxiety and rumination, which could be mitigated by social support, resulting in a sense of well-being and, consequently, better nighttime sleep³⁷.

On the other hand, the only aspect that went against this discussion was the relationship found between emotional support and sleep efficiency, that is, in the face of inefficient sleep, there was a higher score of emotional support. Elderly caregivers with inefficient sleep received a higher score of physical displays of affection compared to those with efficient sleep.

Researchers suggest that having a romantic partner reflects in greater displays of affection, tenderness, and love, leading to the assumption that the elderly might spend more time awake in bed than sleeping. Positive partnerships in relationships reflect commitment, companionship, and can negatively affect nighttime sleep due to the adoption of irregular sleep schedules³⁷. On the other hand, one possible explanation could be that these older adults with inefficient sleep may receive high levels of physical demonstrations of affection and care because they have greater demands.

Study limitations

The study is a cross-sectional design, which precludes the assignment of a cause-and-effect relationship between the variables, meaning it is unclear whether good sleep quality reflects better social support or if better social support reflects better sleep quality.

Furthermore, a small and specific sample of elderly caregivers hinders the generalization of the findings. Research on the quality of sleep and social support among elderly caregivers is still in its early stages, limiting comparisons between the findings and the existing literature. This fact underscores the need for further studies, employing longitudinal designs with elderly caregivers in the community to investigate the direction of the relationship between these variables.

CONCLUSION

The study demonstrated a weak inverse correlation between sleep quality and the positive social interaction dimension. That is, higher social interaction is associated with better sleep quality, and vice versa. Furthermore, statistically significant results were identified between types of support and components of sleep (material support and daytime dysfunction; emotional support and sleep efficiency; positive social interaction and subjective sleep quality and daytime dysfunction). Overall, positive aspects regarding sleep characteristics are associated with higher scores of social support.

The findings of this study can support nursing care aimed at the comprehensive care of elderly individuals and their families, considering the importance of caregivers, with the goal of promoting health and resulting in improvements in the quality of life of elderly caregivers of other elderly individuals.

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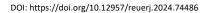
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