



Factors Associated with Poor Sleep Quality in Postpartum Women: A Crosssectional Study

Ana Júlia Pereira Motta Roselma Lucchese^{1D} Graciele Cristina Silva Leão Dayane Eusenia Rosa
Vilmar De Assis Gonçalves Junior Revora Silverio Mendonça

Institute of Biotechnology, University Federal of Catalão, Catalão, GO, Brazil

Address for correspondence Ana Júlia Pereira Motta, Degree in Medicine and Master's in Organizational Management (e-mail: aj_motta@hotmail.com).

Sleep Sci 2024;17(3):e263–e271.

Abstract

Objective This study aimed to analyze the factors associated with poor sleep quality in women in the postpartum period who were assisted in a municipality in central Brazil.

Material and Methods This is a cross-sectional study ($n = 400$) conducted virtually from 2020 to 2021. Sociodemographic and clinical characteristics, self-perceived sleep, and the Pittsburgh Sleep Quality Index (PSQI) were assessed.

Results It was identified that 82% of postpartum women were between 18 and 35-years-old and had an average monthly household income of R\$2,339.27 \pm 1,812.95. It was also found that 33.50% (95% CI: 28.7–38.0) had sleep disorders (PSQI >10); 70.25% (95%CI 65.8–74.8) had poor sleep quality (PSQI >5); 57.4% (95% CI: 52.0–63.1) had inadequate sleep on weekdays/workdays; and 64.1% (95% CI 59.3–69.2) had unsuitable sleep on weekends/days off. It was found that the factors associated with sleep disturbance were: age between <18 years and >35 years ($p = 0.048$); difficulty to think clearly ($p = 0.043$); frequent sadness ($p = 0.046$); poor sleep quality; low income ($p = 0.030$); difficulty to think clearly ($p = 0.013$); and loss of interest in things ($p = 0.030$). As for sleep on weekdays, the associated factors were: marital status without a partner ($p = 0.008$); and being a victim of physical violence ($p = 0.003$). Finally, for sleep on weekends/off: nonwhite skin-color ($p = 0.039$); and having postpartum depression ($p = 0.029$).

Keywords

- postpartum
- sleep quality
- women's health

Conclusion The findings of the present study call attention to the impacts of changes in women's bodies, behavior, and interpersonal relationships caused by the arrival of a newborn. We also highlight the need for a multidisciplinary and comprehensive medical approach in this period.

Introduction

Postpartum, or puerperium, is the pregnancy-puerperal cycle period in which the anatomical, physiological, and mental changes that occur during pregnancy significantly

return to the situation prior to pregnancy. However, these changes may not always be at the desired level and this situation can cause problems in the puerperium¹ and profoundly affect patients' quality of life.²

received
December 26, 2022
accepted
October 3, 2023

DOI <https://doi.org/10.1055/s-0044-1782174>.
ISSN 1984-0659.

© 2024. Brazilian Sleep Association. All rights reserved.
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)
Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

Among the main problems encountered in the puerperium, the most common are fatigue, breast problems, conditions related to the urinary or gastrointestinal systems, and mental disorders such as mood fluctuations and depression.^{3,4} Moreover, these physiological and behavioral issues are associated with changes to the sleep-wake cycle (less exposure to natural light and oscillations in bedtime and wake-up time) and decreased estrogen and progesterone levels, which can interfere with sleep induction and, consequently, decrease sleep duration and quality.⁵

Sleep is a basic human need that postpartum women have difficulty obtaining in adequate quality and quantity. They are significantly more likely to experience sleep disturbances than pregnant women or women in general, with most reporting exhaustion during the first 3-months after labor.^{6,7}

Inadequate sleep in the postpartum period has been linked to poor daytime functioning and reduced neurobehavioral performance, family dysfunction, depressive symptoms, poor infant sleep, low weight gain, and infant restlessness.⁸⁻¹² In addition to scientific evidence showing that poor quality sleep is directly related to postpartum depression, it increases the chances of relapse later in life.^{5,13}

As a result of these studies, it is evident that the common problem is in the sleep-rest area. Thus, knowledge of sleep quality is considered an important clinical device for identifying health problems, including sleep disorders, especially in the puerperal-pregnancy period.

Intervention studies to improve sleep and reduce fatigue in postpartum women have been tested with varying degrees of effectiveness, mainly in the middle-income populations of several countries;^{14,17} however, Brazilian works that assess sleep in this period are scarce.

The few studies performed in Brazil have investigated mental health¹⁸ in isolation from changes in sleep patterns, an underreported problem in postpartum women.¹⁹ Except for a literature review performed by our research group²⁰ with findings that motivated us to investigate the factors associated with sleep quality in women in the postpartum period. Considering the above, our hypothesis is that this group has a greater susceptibility to developing poor sleep quality.

Material and Methods

Participants and Ethics

This is a cross-sectional epidemiological study conducted with postpartum women in two municipalities in the central region of Brazil, specifically in public and private units specialized in maternal and child health. The municipalities involved were one of large size, a state capital, and another of medium size, a reference in health care for 11 regional municipalities.

Data from this survey (questionnaires) were collected virtually from 2020 to 2021 in telephone interviews and completion of a semistructured questionnaire performed on Google Forms with a guarantee of security for volunteers and researchers. This procedure followed the requirements listed in the Guidance Note for Online Research – Research Ethics

Committee (REC) of the UFG/Regional Catalão - *Universidade Federal do Catalão* (UFCAT)²¹ “in transition” (REC/UFG/RC), in accordance with the current norms of the Brazilian National Health Council/National Commission on Research Ethics (CNS/CONEP).

The study was approved by the Research Ethics Committee of UFCAT (Protocol 2.402.949/2017, CAAE (*Certificado de Apresentação para Apreciação Ética* – Certificate of Presentation for Ethical Consideration) 79222717.9.0000.5083). All postpartum women who met the inclusion criteria were invited to participate in the study. Then, the informed consent form (ICF) was signed after explanation of the objectives, benefits, and possible risks of the research. For postpartum women under 18 years old, the informed assent form (IAF) was used instead, and the consent of parents or guardians was obtained.

Eligibility Criteria

Women with a maximum of 90 days from labor, low-risk postpartum period, and age group from 14 to 47 years were recruited. Furthermore, women with medical diagnosis of severe mental disorders and who experienced the loss of a fetus or newborn were excluded from the sample.

Sample Size Calculation

The sampling was nonprobabilistic, but sample calculation was performed for sample size reference, which was described as follows: it was judged for a population of 10,000; with a statistical power of 80% ($\beta = 20\%$); a significance level of 95% ($\alpha = 0.05$); and a design effect of 1.0. As for the percentage of women's illness, the research's base study elected mental illness and an anticipated frequency of 50%, which resulted in a representative sample of 370 postpartum women.

A total of 551 women in the postpartum period were invited to participate in the study, but only 400 answered the instruments, totaling 27.4% of refusals.

Instruments

Initially, a pilot test was conducted with 12 women in a location close to the municipalities where the present study was conducted. Then, the instruments were adjusted and the data collection team was trained. The initial results did not compose the final sample.

A semi-structured questionnaire was applied, which included sociodemographic characteristics such as age, race, education, marital status, income, and occupation, in addition to personal and obstetric history, current pregnancy history, and aspects related to self-perceived sleep quality.²²

To assess sleep quality, the Pittsburgh sleep quality index (PSQI)²³ was used, validated and translated into Portuguese.²⁴ This index is a widely used instrument to measure the subjective quality of sleep during the last month of pregnancy, and has been validated in populations of pregnant women in previous studies,^{25,26} including for postpartum women.²⁷ It is a self-administered questionnaire, composed of 24 questions, with 19 of them being answered

Table 1 Sociodemographic characterization of postpartum women in the central region of Brazil.

Categorical variables	n = 400		
	n (%)	95%CI	
Age			
<18	10 (2.6)	1.0–4.1	
18–35	318 (82.4)	78.5–86.0	
>35	58 (15)	11.7–18.9	
Race ^b			
White	118 (30.5)	25.8–35.1	
Other	269 (69.5)	64.9–74.2	
Education ^c			
Complete and incomplete higher education	88 (22.3)	18.3–26.1	
Complete and incomplete high school	224 (56.9)	52.3–61.4	
Complete and incomplete elementary school	82 (20.8)	17.3–25.1	
Marital status			
With partner	258 (69.7)	60.0–69.3	
Without partner	142 (35.5)	30.8–40.0	
Occupation			
Formal employment	113 (28.2)	24.0–32.5	
Informal employment	51 (12.8)	9.5–16.0	
Student	41 (10.3)	7.2–13.3	
Housewife	145 (36.3)	31.8–41.3	
Unemployed	50 (12.5)	9.5–15.8	
Residence ^d			
Urban area	363(91.7)	88.9–94.2	
Rural area	33 (8.3)	5.8–11.1	
Homeowner ^e			
Yes	243(62.6)	58–67.8	
No	145 (37.4)	32.2–42.0	
Religion ^c			
Catholic	157 (39.5)	34.8–44.6	
Protestant	155 (39)	34.5–44.1	
Spiritist	11(2.8)	1.3–4.5	
None	74 (18.6)	14.6–22.7	
Numerical variables	Mean	95%CI	SD
Age (years) ^a	28.31	27.62–29.00	6.72
People living in the house ^f	4.15	4.01–4.29	1.42
Mean household income (reais) ^g	2,339.27	2,141.38–2,563.27	1,812.95
Education (years) ^h	12.53	12.05–13.02	3.98
Postpartum time (days) ⁱ	7.00	9.50–11.77	1–73

Abbreviations: CI, confidence interval; SD, standard deviation. **Notes:** ^aAnalysis valid for n = 386; ^bAnalysis valid for n = 387; ^cAnalysis valid for n = 397; ^dAnalysis valid for n = 396; ^eAnalysis valid for n = 388; ^fAnalysis valid for n = 392; ^gAnalysis valid for n = 33; ^hAnalysis valid for n = 287; ⁱAnalysis valid for 381, variable expressed as mean and minimum and maximum.

by the interviewed individual and the other 5 directed to their partner. The questions were divided into 7 categories, including: (C1) subjective sleep quality (self-reported); (C2) sleep latency; (C3) sleep duration; (C4) sleep efficiency;

(C5) sleep disturbances; (C6) use of sleeping medication; and (C7) nocturnal dysfunction.²⁴ At the end of the questionnaire, a score of 0 to 21 is obtained, in which a final score greater than 5 indicates poor quality sleep, and a score

greater than 10 indicates sleep disturbance, as proposed by Fonseca et al.²⁸

For the description of mental health conditions, part of the Self-Reporting Questionnaire (SRQ) was used, a self-administered survey instrument developed by the World Health Organization (WHO) with the aim of assessing mental disorders in developing countries. The instrument consists of 20 questions, aimed at assessing non-psychotic disorders, with answers (yes/no), and is able to detect the symptoms of some mental disorders, without specifying the diagnosis of the individuals assessed,^{29,30} validated in Brazil by Mari and Williams.³¹ In the present investigation, the following questions were used to screen any symptom related to the psychological dimension in women with changes in sleep quality: Do you have frequent headaches? Do you feel nervous, tense, or worried? Do you find it difficult to think clearly? Have you felt sad lately? Do you find it difficult to carry out your daily activities with satisfaction? Have you lost interest in things? Do you feel like you are someone useless, without prestige?

Dependent variables were poor sleep quality (yes; no) based on PSQI score >5, sleep disturbance (yes; no), PSQI score >10, and self-reported sleep quality obtained with the question "How would you classify the general quality of your sleep lately?" (good; poor). For the variables sleep on weekdays/work and sleep on weekends/off days, sleep duration was used (recommended ≥ 8 hours; not recommended <8 hours).

Independent variables were sociodemographic information (age, race, education, marital status, occupation, housing, and religion), personal history (practice of physical activity, previous mental illness, and/or victim of physical or psychological violence), and obstetric history (planned pregnancy, number of prenatal visits, pregnancy complications, breastfeeding in the child's 1st of life, and route of delivery).

Statistical Analysis

All statistical analyses were performed in Data Analysis and the Stata (StataCorp LLC., College Station, TX, US) statistical software, version 14.0. Initially, data normality was tested by the Kolmogorov-Smirnov test. Numerical variables were expressed as mean \pm standard deviation (SD) and confidence interval (95% CI). Categorical variables were reported in absolute numbers, prevalence, and 95% CI.

For logistic regression, the odds ratio (OR) effect measure was applied, thus dependent variables underwent bivariate and multiple analysis. In the bivariate analysis, dichotomized independent variables with $p \leq 0.10$ for the multiple model were selected. As for the multiple model, the forced entry method of variables was applied, and those that behaved as confounding or collinear were controlled. Finally, a $p < 0.05$ was considered statistically significant.

Results

Among the interviewees ($n=400$), the mean age was 28 ± 6.72 years (95% CI: 27.68–28.96), with a minimum of

14 years and a maximum of 47 years. The mean schooling was 12 ± 3.98 years of education (95% CI: 12.06–12.99). Most lived with a partner (64.5%, 95% CI: 59.5–69.2) and had a monthly income of $R\$2,339.27 \pm 1,812.957$ (95% CI: 2,141.38–2,563.27). Moreover, 269 participants (69.5%, 95% CI: 64.9–74.2) self-declared as nonwhite. The mothers who had a partner during the puerperal period comprise 258 women (69.7%, 95% CI: 60.0–69.3%). The median postpartum time was 7 days (min: 1, and max: 73).

The data obtained through the PSQI total score showed that 281 women had poor sleep quality (PSQI >5, 70.25%, 95% CI: 65.8–74.8). Moreover, 134 postpartum women were found to have sleep disturbance (PSQI >10, 33.50%, 95% CI: 28.7–38.0).

Independent variables that showed associations for sleep disturbance in postpartum women were age under 18 and over 35 years ($p=0.048$), difficulty to think clearly ($p=0.043$), and frequent sadness ($p=0.046$). ► **Table 2** shows the other variables.

Regarding sleep variables, measured through the volunteers' self-perception, the following percentages were obtained: 39.6% ($n=151$; 95% CI: 34.9–44.6) reported poor/very poor sleep; 57.4% ($n=190$; 95% CI: 52.0–63.1) had inadequate sleep on weekdays/workdays; and 64.1% ($n=214$; 95% CI: 59.3–69.2) had inadequate sleep on weekends/off days.

► **Table 3** presents the bivariate logistic regression analyzes for variables dependent on self-perceived poor sleep quality of postpartum women, such as sleep quality, sleep on weekdays/workdays, and sleep on weekends/off days.

Based on the bivariate analysis, the significant variables were selected for the multiple analysis.

► **Table 4** shows the multiple analysis of dependent variables and associations. There were three dependent variables, shown in ► **Table 3**, that remained associated after multiple analysis for sleep quality: income ($p=0.030$), difficulty to think clearly ($p=0.013$), and loss of interest in things ($p=0.030$). As for sleep on weekdays, the variables were: marital status without a partner ($p=0.008$) and being a victim of physical violence ($p=0.003$). And, finally, for sleep on weekends: nonwhite skin-color ($p=0.039$) and having postpartum depression ($p=0.029$).

Discussion

In this study, we found that 39.6% of postpartum women considered their sleep as poor or very poor. On the other hand, when the same sample was submitted to another form of assessment (PSQI > 5), it was found that 70.2% of them had an impaired sleep quality.

In agreement with this research, a study conducted on 116 women in the postpartum period pointed out that 49.1% of them presented poor sleep quality (PSQI > 5).²⁷ Another assessment conducted in late pregnancy also found a high percentage (67.8%, PSQI > 5).³² The findings of this study reinforce the hypothesis that postpartum women have high vulnerability for poor sleep quality. There is a consensus in the puerperal-pregnancy period that changes in sleep

Table 2 Bivariate and multiple logistic regression of independent variables associated with sleep disturbance (classification by score ≥ 10 by the PSQI) in postpartum women from the central region of Brazil.

Sleep disturbance	Unadjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
<i>Age</i>						
$\geq 18 \leq 35$	1	—	—	1	—	—
$< 18 > 35$	1.664	(0.96–1.50)	0.062	1.77	(1.00–3.14)	0.048
<i>Skin color</i>						
White	1	—	—	—	—	—
Others	0.887	(0.82–1.12)	0.609	—	—	—
<i>Education</i>						
≥ 10	1	—	—	—	—	—
< 10	0.613	(0.71–1.03)	0.146	—	—	—
<i>Income*</i>						
$> 1,900$	1	—	—	—	—	—
$\leq 1,900$	0.701	(0.70–1.11)	0.255	—	—	—
<i>Marital status</i>						
With partner	1	—	—	—	—	—
Without partner	0.792	(0.80–1.06)	0.299	—	—	—
<i>Physical activity</i>						
Yes	1	—	—	—	—	—
No	0.646	(0.64–1.10)	0.182	—	—	—
<i>Difficulty to think clearly**</i>						
No	1	—	—	1	—	—
Yes	1.732	(1.02–1.45)	0.017	1.684	(1.01–2.79)	0.043
<i>Frequent sadness</i>						
No	1	—	—	1	—	—
Yes	1.682	(1.02–1.41)	0.018	1.568	(1.00–2.44)	0.046
<i>Numbers of prenatal care visits</i>						
≥ 6	1	—	—	—	—	—
< 6	0.465	(0.68–0.96)	0.058	0.484	(0.21–1.10)	0.084

Abbreviations: CI, confidence interval; OR, odds ratio. **Notes:** *Income expressed in Brazilian currency (reais, R\$), and each R\$1.00 equals about US \$5.5; **Frequent sadness variable was controlled for having behaved as a confounding variable.

quality and recovery sleep are frequent and result from the physiological changes of pregnancy from physical discomfort and increased endogenous progesterone. It is known that progesterone and estrogen are responsible for activating the neurotransmitters capable of maintaining sleep and some phases of female life.¹³ However, in the postpartum period, there is still no conclusive evidence about this mechanism and effects on sleep.

Data from the present study also indicate that women have inadequate self-perception of their sleep. Similar data described how postpartum women, even with poor sleep duration (< 7 hours/per night), denied having insomnia.³³ Our hypothesis is that this contradiction found in the results obtained by the self-assessment and by the validated questionnaire may occur due to sleep deprivation itself, which is related to reduced cognitive performance.³⁴

During the last trimester of pregnancy and postpartum, several changes in sleep pattern can occur and this is due to changes in the sleep-wake cycle, cortical excitation, reduced latency, and increased rapid eye movement sleep duration, which can lead to sleep disorders such as insomnia, sleep interruption, and poor sleep quality.³⁵ In the sample studied, 33.5% of the volunteers had sleep disorders (PSQI > 10). The high prevalence of poor sleep quality and sleep disorders in this sample can also be justified by the intensified challenges during the COVID-19 pandemic, such as social isolation, reduced support network, and fear of the illness.^{36,37} Additionally, although all postpartum women are vulnerable to changes in sleep quality, it was found that the chances of sleep disorders were 1.77 times greater at the age extremes (under 18 years old and over 35-years-old). This can be explained by the high prevalence of high-risk pregnancies

Table 3 Bivariate analysis of variables dependent on self-perception of poor sleep quality of postpartum women in the central region of Brazil.

Variable	Sleep quality ¹			Sleep on weekday/work ²			Sleep on weekends/day-off ³		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
<i>Age</i>									
≥18 ≤35	1	–	–	1	–	–	1	–	–
<18 >35	1.073	(0.61–1.85)	0.888	0.862	(0.48–1.53)	0.616	0.561	(0.31–1.00)	0.051
<i>Race</i>									
White	1	–	–	1	–	–	1	–	–
Other	0.928	(0.59–1.45)	0.745	1.130	(0.69–1.83)	0.619	1.643	(1.01–2.67)	0.045
<i>Marital status</i>									
With partner	1	–	–	1	–	–	1	–	–
Without partner	1.003	(0.65–1.54)	0.986	1.571	(0.99–2.49)	0.055	1.203	(0.75–1.92)	0.441
<i>Income*</i>									
>1,900	1	–	–	1	–	–	1	–	–
≤19,00	0.643	(0.40–1.01)	0.059	0.9339	(0.58–1.51)	0.797	0.961	(0.58–1.56)	0.875
<i>Health problem</i>									
No	1	–	–	1	–	–	1	–	–
Yes	1.781	(1.02–3.10)	0.041	1.136	(0.62–2.07)	0.762	1.137	(0.62–2.08)	0.761
<i>Physical violence</i>									
No	1	–	–	1	–	–	1	–	–
Yes	1.547	(0.80–2.96)	0.188	0.322	(0.15–0.66)	0.002	1.327	(0.62–2.08)	0.582
<i>Psychological violence</i>									
No	–	–	–	1	–	–	1	–	–
Yes	2.023	(1.19–3.42)	0.010	0.609	(0.34–1.06)	0.083	0.740	(0.41–1.31)	0.302
<i>Postpartum depression</i>									
No	1	–	–	1	–	–	1	–	–
Yes	3.001	(1.11–7.70)	0.022	1.383	(0.49–3.83)	0.620	0.317	(0.11–0.89)	0.023
<i>Frequent headaches</i>									
No	1	–	–	1	–	–	1	–	–
Yes	1.775	(1.11–2.82)	0.016	1.238	(0.75–2.03)	0.451	0.957	(0.57–1.59)	0.897
<i>Nervous or tens feelings</i>									
No	1	–	–	1	–	–	1	–	–
Yes	1.608	(1.03–2.50)	0.036	0.701	(0.43–1.12)	0.156	0.684	(0.42–1.11)	0.147
<i>Find it difficult to think clearly</i>									
No	1	–	–	1	–	–	1	–	–
Yes	2.500	(1.58–3.94)	<0.001	1.110	(0.68–1.79)	0.714	0.969	(0.58–1.59)	0.899
<i>Find it difficult to carry out daily activities with satisfaction</i>									
No	1	–	–	1	–	–	1	–	–
Yes	2.054	(1.35–2.25)	0.001	0.987	(0.62–1.55)	1.000	0.815	(0.51–1.29)	0.409

Table 3 (Continued)

Variable	Sleep quality ¹			Sleep on weekday/work ²			Sleep on weekends/day-off ³		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
<i>Has lost interest in things</i>									
No	1	—	—	1	—	—	1	—	—
Yes	2.872	(1.69–4.88)	<0.001	0.805	(0.46–1.40)	0.477	0.687	(0.38–1.21)	0.235
<i>Useless or worthless thoughts</i>									
No	1	—	—	1	—	—	1	—	—
Yes	2.337	(1.22–4.45)	0.012	1.118	(0.54–2.28)	0.857	0.637	(0.31–1.29)	0.264
<i>Religion</i>									
Yes	1	—	—	1	—	—	1	—	—
No	0.698	(0.40–1.19)	0.231	0.607	(0.35–1.04)	0.074	0.668	(0.38–1.16)	0.192
<i>Breastfeed at the first time</i>									
Yes	1	—	—	1	—	—	1	—	—
No	1.214	(0.75–1.96)	0.429	1.602	(0.93–2.74)	0.085	0.891	(0.52–1.51)	0.683
<i>Pregnancy complications</i>									
No	1	—	—	1	—	—	1	—	—
Yes	1.393	(0.89–2.17)	0.169	0.781	(0.48–1.26)	0.327	0.659	(0.40–1.07)	0.092

Abbreviations: CI, confidence interval; OR, odds ratio. **Note:** *Income expressed in Brazilian currency (*reais*, R\$), and each R\$1.00 equals about US \$5.5; ¹Valid analysis for $n = 381$; ²Valid analysis for $n = 331$; ³Valid analysis for $n = 334$.

Table 4 Multiple analysis of dependent variables such as sleep quality, sleep on weekdays/work, and sleep on weekends/leave off of postpartum women in the central region of Brazil.

Variables	OR	95%CI	p-value
Sleep quality			
Income $\leq 1,900$	0.583	(0.35–0.94)	0.030
Do you feel nervous or tense?	1.233	(0.71–2.12)	0.451
Do you find it difficult to think clearly?	2.067	(1.16–3.66)	0.013
Do you find it difficult to carry out your daily activities with satisfaction?	1.427	(0.85–2.38)	0.173
Have you lost interest in things?	2.089	(1.07–4.07)	0.030
Postpartum depression (Yes)	2.251	(0.68–7.43)	0.183
Sleep on weekdays/work			
No partner	1.975	(1.19–3.26)	0.008
No religion	0.610	(0.33–1.10)	0.101
Did not breastfeeding in the first time?	1.620	(0.92–2.83)	0.091
Suffered physical violence	0.249	(0.09–0.62)	0.003
Suffered psychological violence	1.123	(0.53–2.34)	0.757
Sleep on weekends/days off			
Age (<18 >35 years)	0.579	(0.31–1.05)	0.073
Color (other)	5.484	(1.09–2.74)	0.039
Postpartum depression	0.296	(0.11–0.89)	0.029

Abbreviations: CI, confidence interval; OR, odds ratio.

and, consequently, complications in childbirth,³⁸ greater social vulnerability, lack of partner support (mainly observed in very young women),³⁹ and teenage pregnancy.¹³

Among the sociodemographic factors analyzed in this study, nonwhite skin-color was associated with inadequate sleep on the weekends. Johnson et al.⁴⁰ found that racial/ethnic minority groups, particularly black people, were less likely than white people to report sleep complaints despite having worse overall sleep based on objective measures. However, the current literature presents more studies focused on sleep duration, emphasizing the need to investigate other dimensions of sleep health, which may be even more directly linked to race in terms of biological mechanisms.⁴⁰

Regarding psychological variables, most were shown to be predictors of risk for sleep quality, such as having experienced psychological violence, postpartum depression, recurrent headaches, feeling nervous or tense, difficulty to think clearly, difficulty performing daily activities, loss of interest in things, and feeling useless (– **Table 3**). In a recently published study,⁴¹ it was observed that improving sleep led to significant improvements in mental health, depression, anxiety, and stress. In this regard, strategies to improve the quality of sleep in puerperium women are important, since they can have a beneficial impact on psychological health.

Regarding purchasing power, family income lower than R \$1,900.00 was associated with better sleep quality when compared with mothers with higher incomes. We believe this may be related to sleep quality assessment being impaired in women exposed to greater socioeconomic vulnerability.

Women without a steady partner showed inadequate sleep (<8 hours) on weekends/off, which possibly reflects the lack of a support network on rest days. Studies have reinforced that the absence of social support is associated with poor sleep quality in the postpartum period.^{13,39}

Interestingly, having postpartum depression and having suffered violence proved to be protective factors for the number of hours and quality of sleep. This can be explained by the fact that individuals in these circumstances often use sleeping pills and/or other medications whose side effects cause excessive sleepiness.^{42,43} For future studies, we suggest that these associations be adjusted for medication use, which are known to act as potential confounders.

The limitations of this study are its crosssectional design, which makes it impossible to establish a causal relationship, memory bias, since the questionnaire was self-generated, sample size, and type of nonprobabilistic sampling, which limits the generalization of results. One can also cite the difficulty of performing the PSQI in its entirety, as it is not always possible to apply to women and their companions. It is worth mentioning that assessment of isolated sleep impairments in postpartum women was little publicized in the works cited in researched databases. Therefore, it is necessary to better investigate this topic.

However, this work innovates by exploring sleep assessment globally and fractionally, demonstrating a broad analysis of the investigated object, through five dependent variables and associated independent variables, including

self-perceived sleep quality. It also innovates because it is an unprecedented work performed only with postpartum women in Brazil, which is a sample of people overloaded with newborn care.

Conclusion

Factors associated with poor sleep quality in postpartum women were age extremes (<18 years and >35 years), absence of a partner, income, impaired thinking, lack of interest, frequent sadness, having suffered physical violence, lack of breastfeeding in the 1st hour of life, and history of prior depression.

In the postpartum period, several changes in sleep pattern, such as hormonal and/or behavioral changes, can cause alterations in the sleep-wake cycle, which results in inadequate sleep, as found in this study. Interventions focused on improvements to postpartum sleep quality are effective in the prevention and early diagnosis of illnesses associated with impaired quality of life of these women, especially as related to mental disorders.

Funding Source

The author(s) received no financial support for the research.

Conflict of Interests

The authors have no conflict of interests to declare.

References

- Sevil U, Ertem G. Postpartum Period, 'Periatology and Care', 1st edn. Nobel Medicine Publisher; 2016. p. 409–41
- Mokhtaryan-Gilani T, Kariman N, Nia HS, et al. Avaliação dos Preditores da Qualidade de Vida no Puerpério: Um Estudo Transversal. Iran J Public Health 2022;51(06):1389–1399
- Yildiz H, Kucuksahin N. Postpartum problems and care needs of mothers living in a rural area. Turk Aile Hekim Derg 2013;15:159–166
- Aksu S, Varol FG, Hotun Sahin N. Long-term postpartum health problems in Turkish women: prevalence and associations with self-rated health. Contemp Nurse 2017;53(02):167–181
- Okun ML. Disturbed sleep and postpartum depression. Curr Psychiatry Rep 2016;18(07):66
- Kennedy HP, Gardiner A, Gay C, Lee KA. Negotiating sleep: a qualitative study of new mothers. J Perinat Neonatal Nurs 2007;21(02):114–122
- National Sleep Foundation. Sleep Foundation. 2012. Available from: <https://www.sleepfoundation.org/>. Accessed Nov 2, 2022.
- Coo S, Milgrom J, Trinder J. Mood and objective and subjective measures of sleep during late pregnancy and the postpartum period. Behav Sleep Med 2014;12(04):317–330
- Fujiwara T, Yamaoka Y, Morisaki N. Self-reported prevalence and risk factors for shaking and smothering among mothers of 4-month-old infants in Japan. J Epidemiol 2016;26(01):4–13
- Gress-Smith JL, Luecken LJ, Lemery-Chalfant K, Howe R. Postpartum depression prevalence and impact on infant health, weight, and sleep in low-income and ethnic minority women and infants. Matern Child Health J 2012;16(04):887–893
- Insana SP, Williams KB, Montgomery-Downs HE. Sleep disturbance and neurobehavioral performance among postpartum women. Sleep 2013;36(01):73–81
- Piteo AM, Roberts RM, Nettelbeck T, et al. Postnatal depression mediates the relationship between infant and maternal sleep

- disruption and family dysfunction. *Early Hum Dev* 2013;89(02): 69–74
- 13 Emamian F, Khazaie H, Okun ML, et al. Link between insomnia and perinatal depressive symptoms: A meta-analysis. *J Sleep Res* 2019;28(06):e12858
 - 14 Lee KA, Gay CL. Can modifications to the bedroom environment improve the sleep of new parents? Two randomized controlled trials. *Res Nurs Health* 2011;34(01):7–19
 - 15 Varcho MS, Hill PD, Anderson M. Evaluation of the Tiredness Management Guide: a pilot study. *Appl Nurs Res* 2012;25(02): 123–128
 - 16 Stremler R, Hodnett E, Kenton L, et al. Effect of behavioural-educational intervention on sleep for primiparous women and their infants in early postpartum: multisite randomised controlled trial. *BMJ* 2013;346:f1164
 - 17 Giallo R, Cooklin A, Dunning M, Seymour M. The efficacy of an intervention for the management of postpartum fatigue. *J Obstet Gynecol Neonatal Nurs* 2014;43(05):598–613
 - 18 Sousa PHSF, Souza RF, Nascimento RT, et al. Fatores de risco associados à depressão pós-parto: Revisão integrativa. *Braz J Dev.* 2021;7(01):11447–11462
 - 19 da Silva AR, Manguiera SdeO, Perrelli JGA, et al. Avaliação do diagnóstico de enfermagem Padrão de sono prejudicado em puérperas. *Rev Cubana Enferm* 2020;36(01):
 - 20 Motta AJ, Lucchese R, Souza R, et al. Má qualidade do sono em mulheres no período puerperal. *Braz J Dev.* 2022;8(11): 75233–75245
 - 21 Comitê de Ética em Pesquisa da UFG/Regional Catalão - UFCAT “em transição” aos nove dias do mês de julho de 2020. Segunda Nota Informativa: Protocolos aprovados antes da pandemia e que necessitam de adequações para darem continuidade à pesquisa.
 - 22 Silva V, Ferreira C, Basílio A, et al. Sintomatologia depressiva no termo da gestação, em mulheres de baixo risco. *J Bras Psiquiatr* 2019;68:65–71
 - 23 Buysse DJ, Reynolds CF III, Monk TH, et al. Quantification of subjective sleep quality in healthy elderly men and women using the Pittsburgh Sleep Quality Index (PSQI). *Sleep* 1991;14(04): 331–338
 - 24 Bertolazi AN, Fagundes SC, Hoff LS, et al. Validation of the Brazilian Portuguese version of the Pittsburgh sleep quality index. *Sleep Med* 2011;12(01):70–75
 - 25 Zhong QY, Gelaye B, Sánchez SE, Williams MA. Psychometric Properties of the Pittsburgh Sleep Quality Index (PSQI) in a Cohort of Peruvian Pregnant Women. *J Clin Sleep Med* 2015;11(08): 869–877
 - 26 Qiu C, Gelaye B, Zhong QY, et al. Construct validity and factor structure of the Pittsburgh Sleep Quality Index among pregnant women in a Pacific-Northwest cohort. *Sleep Breath* 2016;20(01):293–301
 - 27 Okun ML, Mancuso RA, Hobel CJ, et al. Poor sleep quality increases symptoms of depression and anxiety in postpartum women. *J Behav Med* 2018;41(05):703–710
 - 28 Fonseca DC, Galdino DAA, Guimarães LHC, Alves DAG. Avaliação da qualidade do sono e sonolência excessiva diurna em mulheres idosas com incontinência urinária. *Rev Neurociências.* 2010;18 (03):294–299
 - 29 Harding TW, de Arango MV, Baltazar J, et al. Mental disorders in primary health care: a study of their frequency and diagnosis in four developing countries. *Psychol Med* 1980;10(02):231–241
 - 30 Santos KOB, Araújo TM, Pinho PS, Silva ACC. Avaliação de um instrumento de mensuração de morbidade psíquica: estudo de validação do Self-Reporting Questionnaire (SRQ-20). *Rev Baiana Saúde Pública.* 2010;34(03):544
 - 31 Mari JJ, Williams P. A validity study of a psychiatric screening questionnaire (SRQ-20) in primary care in the city of Sao Paulo. *Br J Psychiatry* 1986;148(01):23–26
 - 32 Lee H, Kim KE, Kim MY, Park CG. Comparison of factor structures of the Pittsburgh sleep quality index between mid- and late pregnancy among Korean women: a cross-sectional study. *BMC Pregnancy Childbirth* 2022;22(01):694
 - 33 Creti L, Libman E, Rizzo D, et al. Sleep in the postpartum: Characteristics of first-time, healthy mothers. *Sleep Disord* 2017;2017:8520358
 - 34 Csipo T, Lipecz A, Owens C, et al. Sleep deprivation impairs cognitive performance, alters task-associated cerebral blood flow and decreases cortical neurovascular coupling-related hemodynamic responses. *Sci Rep* 2021;11(01):20994
 - 35 Maghami M, Shariatpanahi SP, Habibi D, et al. Sleep disorders during pregnancy and postpartum depression: A systematic review and meta-analysis. *Int J Dev Neurosci* 2021;81(06): 469–478
 - 36 Janse van Rensburg M, Smith H. Navigating uncertainty, employment and women’s safety during COVID-19: Reflections of sexual assault resistance educators. *Gend Work Organ* 2021;28 (Suppl 1):122–136
 - 37 Mullins E, Hudak ML, Banerjee J, et al. PAN-COVID investigators and the National Perinatal COVID-19 Registry Study Group. Pregnancy and neonatal outcomes of COVID-19: coreporting of common outcomes from PAN-COVID and AAP-SONPM registries. *Ultrasound Obstet Gynecol* 2021;57(04):573–581
 - 38 Holand BL, Fonseca SG, Drehmer M, Bosa VL. Adequacy of prenatal care considering nutritional assistance in Southern Brazil: Maternal Cohort Study. *Cad Saude Publica* 2021;37(06):e00130320
 - 39 Ghaedrahmati M, Kazemi A, Kheirabadi G, et al. Postpartum depression risk factors: A narrative review. *J Educ Health Promot* 2017;6:60
 - 40 Johnson DA, Jackson CL, Williams NJ, Alcántara C. Are sleep patterns influenced by race/ethnicity - a marker of relative advantage or disadvantage? Evidence to date. *Nat Sci Sleep* 2019;11:79–95
 - 41 Yue L, Zhao R, Xiao Q, et al. The effect of mental health on sleep quality of front-line medical staff during the COVID-19 outbreak in China: A cross-sectional study. *PLoS One* 2021;16(06): e0253753
 - 42 Frieder A, Ferst M, Hainline R, Deligiannidis KM. Pharmacotherapy of Postpartum Depression: Current Approaches and Novel Drug Development. *CNS Drugs* 2019;33(03):265–282
 - 43 de Moraes Costa G, Zanatta FB, Ziegelmann PK, et al. Pharmacological treatments for adults with post-traumatic stress disorder: A network meta-analysis of comparative efficacy and acceptability. *J Psychiatr Res* 2020;130:412–420