Association Between Melatonin Use and Cardiovascular Disease Across Menopausal Stages

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INTRODUCTION

- Exogenous melatonin is widely used among older women to manage sleep disruptions, particularly as they undergo menopause-induced hormonal changes.
- While melatonin is not known to cause dependency, individuals who initiate melatonin use often increase dose and length of their use beyond what is clinically recommended.
- Recent studies suggest that prolonged melatonin use may lead to worse cardiovascular health outcomes, but no studies to date have rigorously examined the association between prescribed melatonin use and cardiovascular disease diagnosis among pre-, peri-, and post-menopausal women.
- **This study filled the gap in the literature by examining the relationship between melatonin use and cardiovascular disease in a nationally representative sample of women, and whether the relationship varies by menopausal status.**

METHODS

- **Data Source:** Medical Expenditure Panel Survey (MEPS), 2016–2023
- **Sample**: Nationally representative sample of non-institutionalized civilian adult women in the U.S. (N=90,999)
- **Analysis**: Binary logistic regression stratified by menopausal status (pre, peri, post)
- **Exposure:** Prescribed melatonin use
- **Outcome:** Cardiovascular disease diagnosis (ICD-10 dx codes: I00-I99)
- **Stratifying variable**: Age group as a proxy measure of menopausal status
- **Covariate Selection:** Based on Andersen Model of Health Care Utilization

RESULTS

- The unadjusted model showed that prescribed melatonin use was associated with a higher odds of cardiovascular disease diagnosis (OR=3.65, 95% CI=2.76-4.83, p<0.01).
- The adjusted model showed that prescribed melatonin use was associated with a higher odds of cardiovascular disease diagnosis (AOR=1.83, 95% CI=1.29-2.61, p<0.001). This effect remained among post-menopausal women (AOR=2.09, 95% CI=1.32-3.31, p<0.01), but not among pre- and peri-menopausal women.

Melatonin use was associated with a higher odds of cardiovascular disease, particularly among post-menopausal women (aged 55+ years).

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Table 1. Characteristics of the Study Population (MEPS 2016-2023 N=90,999)

	Overall
	n (%)
Melatonin Use	
No	90,791 (99.8%)
Yes	208 (0.23%)
Menopausal Status	
Pre-menopausal (<45)	37,401 (41.1%)
Peri-menopausal (45-54)	14,727 (16.2%)
Post-menopausal (55+)	38,871 (42.7%)
Race/Ethnicity	
Hispanic	20,656 (22.7%)
Non-Hispanic White	47,548 (52.3%)
Non-Hispanic Black	14,703 (16.2%)
Non-Hispanic Asian/Other	8,092 (8.89%)
	Mean (SD)
Age	50.0 (18.4)

Table 2. Binary Logistic Regression of Cardiovascular Disease Among Women (MEPS 2016-2023, N=90,999)

	Overall	Pre-menopausal (<45)	Peri-menopausal (45-54)	Post-menopausal (55+)
	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)
Melatonin Use				
No	Reference	Reference	Reference	Reference
Yes	1.83 (1.29, 2.61)***	1.54 (0.67, 3.55)	1.17 (0.53, 2.59)	2.09 (1.32, 3.31)***
Age	1.08 (1.08, 1.08)***	1.10 (1.10, 1.11)***	1.08 (1.07, 1.10)***	1.06 (1.06, 1.06)***
Perceived Physical Health				
Good-Excellent	Reference	Reference	Reference	Reference
Fair/Poor	2.01 (1.90, 2.12)***	2.97 (2.65, 3.33)	2.01 (1.80, 2.24)	1.65 (1.53, 1.76)
Perceived Mental Health				
Good-Excellent	Reference	Reference	Reference	Reference
Fair/Poor	0.94 (0.88, 0.99)*	0.99 (0.86, 1.13)	1.09 (0.95, 1.25)	0.84 (0.78, 0.92)
Race/Ethnicity				
Hispanic	Reference	Reference	Reference	Reference
Non-Hispanic White	1.12 (1.06, 1.18)***	1.45 (1.29, 1.64)***	1.22 (1.09, 1.36)***	1.01 (0.94, 1.08)
Non-Hispanic Black	2.21 (2.08, 2.36)***	2.30 (2.02, 2.62)***	2.37 (2.09, 2.70)***	2.05 (1.88, 2.23)
Non-Hispanic Asian/Other	1.05 (0.97, 1.14)	1.06 (0.88, 1.27)	1.14 (0.97, 1.34)	1.01 (0.91, 1.12)
Education				
Less than High School	Reference	Reference	Reference	Reference
High School/GED	0.93 (0.88, .98)*	1.00 (0.87, 1.15)	0.85 (0.75, 0.97)*	0.93 (0.86, 1.00)*
Some College	0.94 (0.89, 1.01)	1.10 (0.95, 1.28)	0.86 (0.75, 0.98)*	0.92 (0.85, 1.00)*
College+	0.71(0.68, 0.77)***	0.81 (0.69, 0.95)	0.61 (0.53, 0.70)***	0.73 (0.67, 0.79)***
Family Poverty				
Negative/Poor	Reference	Reference	Reference	Reference
Near Poor	1.04 (0.96, 1.14)	0.99 (0.82, 1.19)	1.14 (0.93, 1.40)	1.08 (0.97, 1.21)
Low Income	0.95 (0.89, 1.01)	0.79 (0.68, 0.91)**	0.96 (0.83, 1.11)	1.04 (0.96, 1.13)
Middle Income	0.96 (0.90, 1.11)	0.90 (0.78, 1.03)	0.98 (0.84, 1.12)	1.10 (0.94, 1.09)
High Income	0.91 (0.86, 0.97)**	0.77 (0.66, 0.90)**	0.97 (0.83, 1.13)	0.93 (0.86, 1.01)
Census region				
Northeast	Reference	Reference	Reference	Reference
Midwest	1.11 (1.04, 1.17)***	1.38 (1.18, 1.61)***	1.10 (0.96, 1.26)	1.05 (0.98, 1.13)
South	1.12 (1.07, 1.18)***	1.48 (1.29, 1.70)***	1.26 (1.12, 1.42)***	1.01 (0.95, 1.08)
West	0.86 (0.81, 0.91)***	1.00 (0.85, 1.17)	0.91 (0.80, 1.04)	0.82 (0.76, 0.87)***
Marital Status				
Not married	Reference	Reference	Reference	Reference
Married	0.98 (0.94, 1.01)	0.91 (0.83, 1.00)	0.90 (0.83, 0.99)	0.95 (0.91. 1.00)*
Insurance coverage				
Any private	Reference	Reference	Reference	Reference
Public or uninsured	0.89 (0.85, 0.93)***	0.92 (0.82, 1.03)	0.91 (0.81, 1.01)	0.93 (0.88, 0.98)**
Walking/physical limitation				
No	Reference	Reference	Reference	Reference
Yes	1.64 (1.55, 1.73)***	1.60 (1.35, 1.89)***	1.50 (1.31, 1.71)***	1.71 (1.61, 1.83)***
Activity limitation				
No	Reference	Reference	Reference	Reference
Yes	1.36 (1.27, 1.45)***	1.56 (1.30, 1.87)***	1.33 (1.14, 1.56)***	1.27 (1.17, 1.37)***
IADL limitation				
No	Reference	Reference	Reference	Reference
Yes	1.07 (0.97, 1.19)	1.75 (1.32, 2.33)***	1.16 (0.89, 1.51)	1.06 (0.94, 1.19)
ADL limitation				
No	Reference	Reference	Reference	Reference
Yes	0.78 (0.68, 0.88)***	0.69 (0.48, 1.00)*	1.27 (0.91, 1.79)	0.80 (0.70, 0.92)**
Calendar Year				
2016	Reference	Reference	Reference	Reference
2017	0.95 (0.89, 1.01)	0.95 (0.82, 1.09)	1.05 (0.91, 1.20)	0.90 (0.83, 0.99)*
2018	0.82 (0.77, 0.88)***	0.83 (0.71, 0.96)*	0.87 (0.76, 1.01)	0.80 (0.73, 0.87)***
2019	0.81 (0.75, 0.86)***	0.80 (0.69, 0.94)**	0.93 (0.80, 1.07)	0.77 (0.70, 0.84)***
2020	0.82 (0.76, 0.88)***	0.73 (0.60, 0.87)***	0.92 (0.78, 1.08)	0.80 (0.73, 0.88)***
2021	0.82 (0.77, 0.88)***	0.79 (0.68, 0.93)**	0.86 (0.74, 1.00)*	0.80 (0.74, 0.87)***
2022	0.85 (0.79, 0.91)***	0.88 (0.75, 1.04)	0.94 (0.80, 1.09)	0.81 (0.74, 0.89)***
2023	0.73 (0.68, 0.79)***	0.72 (0.60, 0.86)***	0.83 (0.17, 0.99)*	0.71 (0.65, 0.78)***
Intercept	0.01 (0.01, 0.01)***	0.00 (0.00, 0.00)***	1.01 (0.00, 0.01)***	0.02 (0.02, 0.03)***

Note. Outcome defined as Cardiovascular disease (inclusive) based on conditions file.
Abbreviations: AOR=Adjusted Odds Ratio, CI=Confidence Interval, GED=General Educational Development, ADL=Activities of Daily Living, IADL=Instrumental Activities of Daily Living, MEPS = Medical Expenditure Panel Survey
*p<0.05; **p<0.01; *** p<0.001

SELECTED REFERENCES

- Hamoda, H., Moger, S., Morris, E., Baldeweg, S., Kasliwal, A., Gabbay, F., & Wright, H. (2022). Menopause practice standards. Post Reproductive Health, 28(3), 127–132.
- El Khoudary, S. R., Aggarwal, B., Beckie, T. M., Hodis, H. N., Johnson, A. E., Langer, R. D., Limacher, M. C., Manson, J. E., Stefanick, M. L., & Allison, M. A. (2020). Menopause transition and cardiovascular disease risk: Implications for timing of early prevention. Circulation, 142(25), e506–e532.
- Mehta, J. M., & Manson, J. E. (2024). The menopausal transition period and cardiovascular risk. Nature Reviews Cardiology, 21(3), 203–211.
- Santoro, N., Roeca, C., Peters, B. A., & Neal-Perry, G. (2021). The menopause transition: Signs, symptoms, and management options. Journal of Clinical Endocrinology & Metabolism, 106(1), 1–15.

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