Sleep Disturbances in Midlife Women:

Are there Ethnic or Class Differences, or Is it All Just Hormonal?

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Framework for Sleep Disturbances

Insufficient Sleep
- age/development
- life style
- circadian phase shift

Fragmented Sleep
- sleep disorder (snoring, apnea)
- (Restless Legs)
- acute illness
- chronic illness

sleep loss

Adverse Health Outcomes

Physiological
- alterations in immune function, metabolism,
  (insulin resistance, redistribution of adiposity)

Cognitive/Behavioral
- fatigue, impaired memory, accidents

Social
- poor social/family interactions, unemployment
  health care costs and utilization

Decreased Quality of Life

Nursing Outlook
Sleep Measures

- Polysomnography (PSG): The Gold Standard
Typical Adult Sleep

![Graph showing typical adult sleep stages over 7 hours of sleep, with stages 1 to 4 and REM sleep highlighted.]

**Sleep stages**

- Awake
- REM

**Hours of sleep**

1 2 3 4 5 6 7

**Young Adult**
Wrist Actigraphy

Movement counts and acceleration of movement
Estimates total sleep time and awakenings
Underestimates sleep in active sleepers
Overestimates sleep in sedentary persons
Not useful for sleep stages
Less invasive than PSG
Literature Review on Sleep and Health Disparities


- 5000 random New Zealanders (50% response)
  - Evening chronotype: 2.5x more likely to be in poorer health, 1.5x more likely to be a night-shift worker, 1.5x more likely to be unemployed.
  - Chronotype was independent of gender, ethnicity (Maori or non-Maori), and socioeconomics.
  - No difference in self-reported sleep duration

- Community sample of 1,139 adults in Detroit and self-report of sleep quantity and quality.

- Sleep *quantity* (mean $6.5 \pm 1.4$ hrs) was less for non-Whites compared to Whites, and was related to mental and physical health, but not to SES.

- Sleep *quality* mediated effects of income on mental and physical health.

- Income mediated the effect of education on sleep *quality*.

Sleep apnea, obstructive sleep apnea (OSA), obstructive sleep apnea syndrome (OSAS), sleep disordered breathing (SDB):

- complex disorder determined by several phenotypes: obesity, craniofacial structure, abnormal neuromuscular and ventilatory control.
- Genetics may explain ethnic clustering, modulated by cultural and environmental factors (See Redline, Cleveland Cohort Study)

- significantly higher incidence of “probable” OSAHS in African Americans (in Chicago sample) with health fair screening, and
- their bed partners were more likely to accept the snoring as normal.

- Sleep duration with actigraphy was 6.1±1.2 hrs
  - 6.7 hrs for White women
  - 6.1 hrs for White men
  - 5.9 hrs for Black women
  - 5.1 hrs for Black men
- Significant after adjusting for SES, employment, household and lifestyle factors, and apnea risk.
Dawn Dailey’s study

Secondary analysis using CDC’s 2002 Behavioral Risk Factor Surveillance System (BRFSS) database -- ongoing data collection program to measure behavioral risk factors in random samples of adults 18 years and older

N = 62,341 individuals 18 to 65 years.

Sleep adequacy:
• During the past 30 days, for about how many days have you felt you did not get enough rest or sleep?

Reencoded categories:
• Adequate = 0-11 days
• Moderately inadequate = 12-23 days
• Severely inadequate = 24-30 days
Dawn Dailey’s Results

- **Sleep Inadequacy**
  - Moderately
  - Severely

- **Percentage**
  - 12-23 days
  - 24-30 days

- **Groups**
  - White
  - Black
Dawn Dailey’s Results

1. very little variance ($R^2 < 4\%$) in sleep adequacy was due to external factors (role demands).

2. ethnicity was not a significant predictor of sleep inadequacy.

3. anxiety, depression, and perceived health were significant predictors of sleep inadequacy ($R^2 = 15\%$).

4. sleep inadequacy in Caucasian women explained by: anxiety, depression, age, perceived health, and number of children.

5. sleep inadequacy in African American women explained by: anxiety, depression, age, physical illness and employment.
National Sleep Foundation Poll (1998)

- Women report about 6.5 hrs sleep/night
- Women report 8-13 more minutes of sleep per night than men, but
- More women c/o insomnia (63%) than men (54%)
  - Trouble sleeping at least 1/wk (Better Sleep Council):
    - Women: 26%
    - Men: 16%
Prevalence of sleep problems in midlife women:

<table>
<thead>
<tr>
<th>Age</th>
<th>Sleep “Problem”*</th>
<th>Sleep Med**</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 y/o</td>
<td>20%</td>
<td>2%</td>
</tr>
<tr>
<td>50 y/o</td>
<td>37%</td>
<td>12%</td>
</tr>
<tr>
<td>60 y/o</td>
<td>37%</td>
<td></td>
</tr>
</tbody>
</table>

most common symptom associated with estrogen insufficiency:
hot flash, flush, night sweat
Hot Flashes and Sleep

- Wake episode occurs up to 1 minute before a change in skin resistance or temperature is detected.

- 60% of awakenings are associated with a hot flash.


n=9 (30-55 y/o) post-menopause 1-5 yrs 3 nights polysomnography
Longitudinal Midlife Study

- To describe women’s sleep over time, from pre-menopause to post-menopause, in relation to bio-psycho-social-cultural factors:
  - FSH level
  - diet, exercise, smoking, & body weight
  - stress and emotional health
  - family and social relationships
Co-Investigators

- Yewoubdar Beyene, PhD  Anthropologist
- Yolanda Gutierrez, PhD, RD  Nutritionist
- Nan Murrell, RN, PhD  UT Galveston
- Diana Taylor, RN, PhD, FAAN  UCSF
- John Neuhaus, PhD  Statistician  UCSF
- Catherine Gilliss, RN PhD FAAN  Yale

(NIH R01 NR04259, 1995-2000)
Office of Women’s Health Supplement, 2001-2002
Methods

Community-based sample of healthy regularly menstruating women
Live in U.S. at least 20 years
40 - 48 years of age
- Self-Identified as:
  - European American
  - African American
  - Mexican/Central America
Sleep Measures

- **Pittsburgh Sleep Quality Index**
  - 7 components (Buysse, et al., 1989)

- **Paffenbarger Physical Activity Scale**
  - Reclining/sleeping weekdays
  - Reclining/sleeping weekends

- **Wrist actigraphy with sleep log**
  (Ambulatory Monitoring, Inc, NY)
### Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>African American (n = 89)</th>
<th>European American (n = 163)</th>
<th>Mexican/Central American (n = 94)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± SD)</td>
<td>43.1 ± 2.5</td>
<td>43.4 ± 2.2</td>
<td>43.6 ± 2.5</td>
</tr>
<tr>
<td>FSH (urine IU/dl)</td>
<td>0.9 ± .66</td>
<td>0.7 ± .55</td>
<td>0.7 ± .47</td>
</tr>
<tr>
<td>Currently Smoke</td>
<td>32%</td>
<td>17%</td>
<td>21%</td>
</tr>
<tr>
<td>Mean household income/yr</td>
<td>$40,000*</td>
<td>$70,000</td>
<td>$50,000</td>
</tr>
</tbody>
</table>
### Demographics (continued)

<table>
<thead>
<tr>
<th></th>
<th>African American (n = 89)</th>
<th>European American (n = 163)</th>
<th>Mexican/Central American (n = 94)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Place: USA</td>
<td>95%</td>
<td>95%</td>
<td>58%</td>
</tr>
<tr>
<td>English as a second language</td>
<td></td>
<td></td>
<td>58%</td>
</tr>
<tr>
<td>Not currently employed</td>
<td>13%*</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Married/Partner</td>
<td>41%*</td>
<td>64%</td>
<td>72%</td>
</tr>
<tr>
<td>Completed High School</td>
<td>93%</td>
<td>96%</td>
<td>72%*</td>
</tr>
<tr>
<td>Have 1 or more children</td>
<td>59%</td>
<td>59%</td>
<td>76%*</td>
</tr>
</tbody>
</table>
Marital Satisfaction and Social Support - Time 1

- Marital Satisfaction
- Social Support

African Am (89)
Euro Am (163)
Latinas (94)
Perceived Stress and Depressive Symptoms

- Stress CES-D (p = .03)

- African Am (89)
- Euro Am (163)
- Latinas (94)
Perceived sleep quality was **not significantly different** for:

<table>
<thead>
<tr>
<th>Category</th>
<th>PSQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women with children (58%)</td>
<td>5.3 ± 3.2</td>
</tr>
<tr>
<td>Women without children (42%)</td>
<td>4.8 ± 2.7</td>
</tr>
<tr>
<td>Employed women (86%)</td>
<td>5.2 ± 3.0</td>
</tr>
<tr>
<td>Unemployed women (14%)</td>
<td>5.1 ± 3.1</td>
</tr>
</tbody>
</table>

- Exercise / no exercise: NS
- Alcohol / caffeine: NS
Correlates of Perceived Sleep

Sleep quality (PSQI) was significantly different for:

- Single women (47%)  
  PSQI: 5.7 ± 3.1 (p=.005)
- Married/Partnered Women  
  PSQI: 4.8 ± 3.0
- Smokers (22%)  
  PSQI: 5.7 ± 3.1 (p=.01)
- Non-smokers  
  PSQI: 4.8 ± 2.6
- At risk for depression (29%)  
  PSQI: 7.4 ± 3.5 (p<.001)
- Not at risk for depression  
  PSQI: 4.2 ± 2.2
- African Americans
Midlife Women: Subjective Sleep Measures

- PSQI*: *(p<.001)
- Wk day (hrs)*
- Wk end (hrs)*

African Am (89)
Euro Am (163)
Latinas (94)
Midlife Women: Objective Measures

<table>
<thead>
<tr>
<th></th>
<th>African American</th>
<th>Euro American</th>
<th>Latinas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 4</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Total Sleep Time (minutes)

- 300
- 330
- 360
- 390
- 420
- 450
- 480
Wrist Actigraphy
Wake After Sleep Onset (%)
Correlates of Perceived Sleep Quality (Times 1-3)

Sleep quality (PSQI) was significantly related to:

- depressive symptoms: $r = 0.62$ to $0.75$
- stress perception: $r = 0.48$
- Body mass index: $r = 0.26$
- Follicle Stim. hormone: $r = 0.12$ (p = 0.022)
A Bio-Psycho-Social Framework for Predicting Sleep Problems in Midlife Women

- **Biological Factors** 1%
  - Age/FSH
  - Body weight/diet
  - Smoking
  - Exercise *

- **Psychological Factors** 30%
  - Depression *
  - Stress

- **Social factors** 4%
  - Supportive relations
  - Multiple roles (wife, mother, employee)
  - Ethnicity *
  - Education *

→ Sleep Complaints
Conclusion

Rather than attributing menopausal sleep problems to the absence of estrogen, other pre-existing factors:

- Biological (diet, exercise, alcohol/caffeine, diabetes),
- Psychological (depression, perceived stress), or
- Social (poor relationships)

are more likely to play a major role