

Sex Differences in Sleep and Circadian Rhythms: Consequences to Health

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Forum on Neuroscience and Nervous System Disorders
Sex Differences and Implications for Neuroscience Research

San Francisco, CA

March 8 & 9, 2010

Background

Humans spend @ 1/3 of their lives asleep

There is not one dimension of health and functioning that is not impacted by sleep and circadian rhythms (and vice versa)

We have seen that sex differences are observed in sleep and circadian rhythms

We have seen that sex differences in sleep and circadian rhythms bear on mental health

So...

do these sex differences matter to the sleep-health relationship?



Sex differences in the consequences of sleep and circadian rhythm disturbances to health: Why study them?

Option 1:

The George Mallory - Mount Everest approach

When questioned, “Why do you want to climb Mount Everest?”

George Mallory replied “Because it is there.”

More preferable is Option 2:

Study sex differences in light of compelling theoretical rationale or empirical evidence that sex differences in sleep or circadian rhythms bear on resilience or vulnerability to disease.

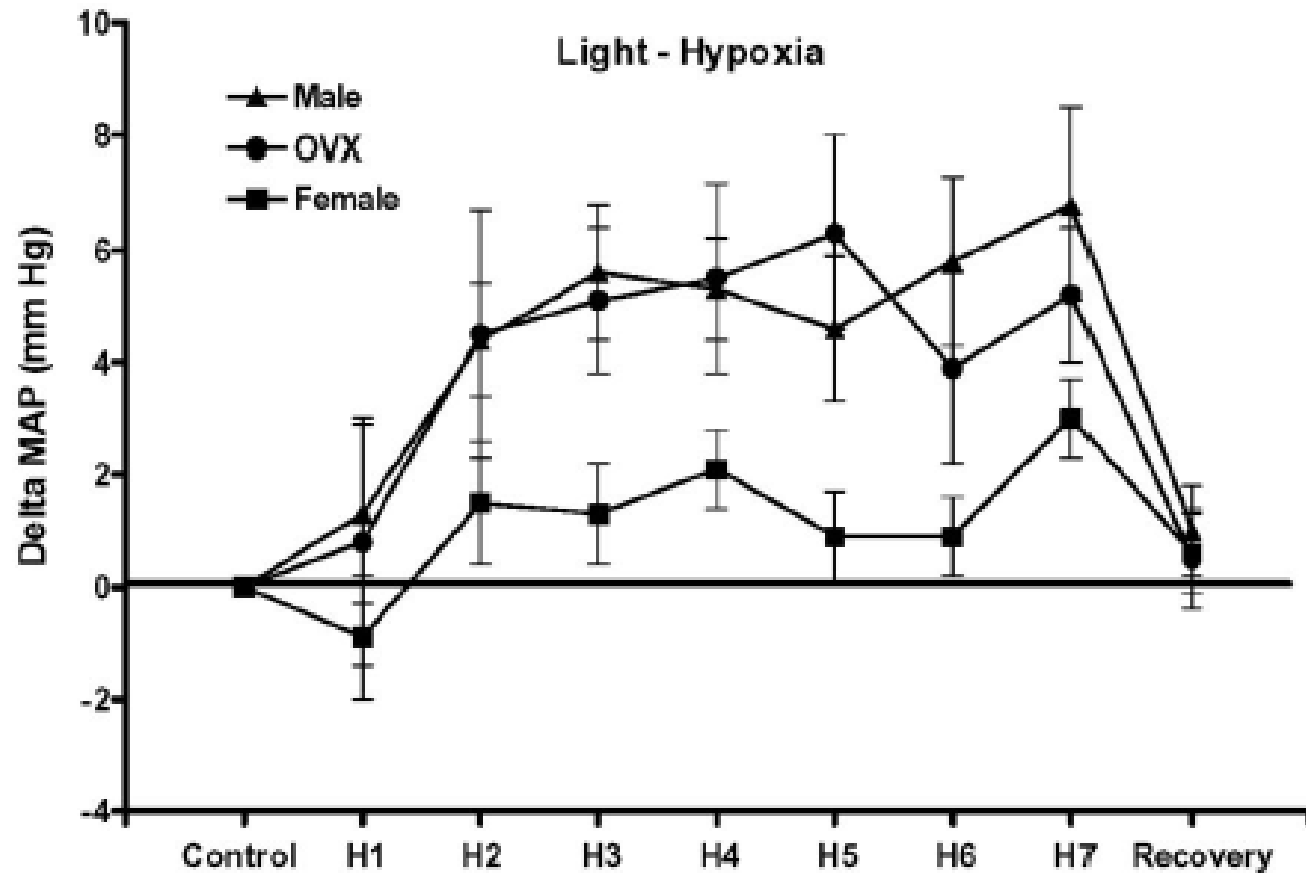
Sleep and Health: State of Science (2010)

Areas of Emphasis: Obesity, Cardiovascular Disease, Metabolic Disease (Type 2 diabetes)

To date, the majority of sleep studies have focused on one “suspect:” Sleep Apnea

To date, the majority of study participants have been male (human and animal models), with the exception of studies related to sleep during the menopausal transition.

Sex differences in response to hypoxia (during sleep period)

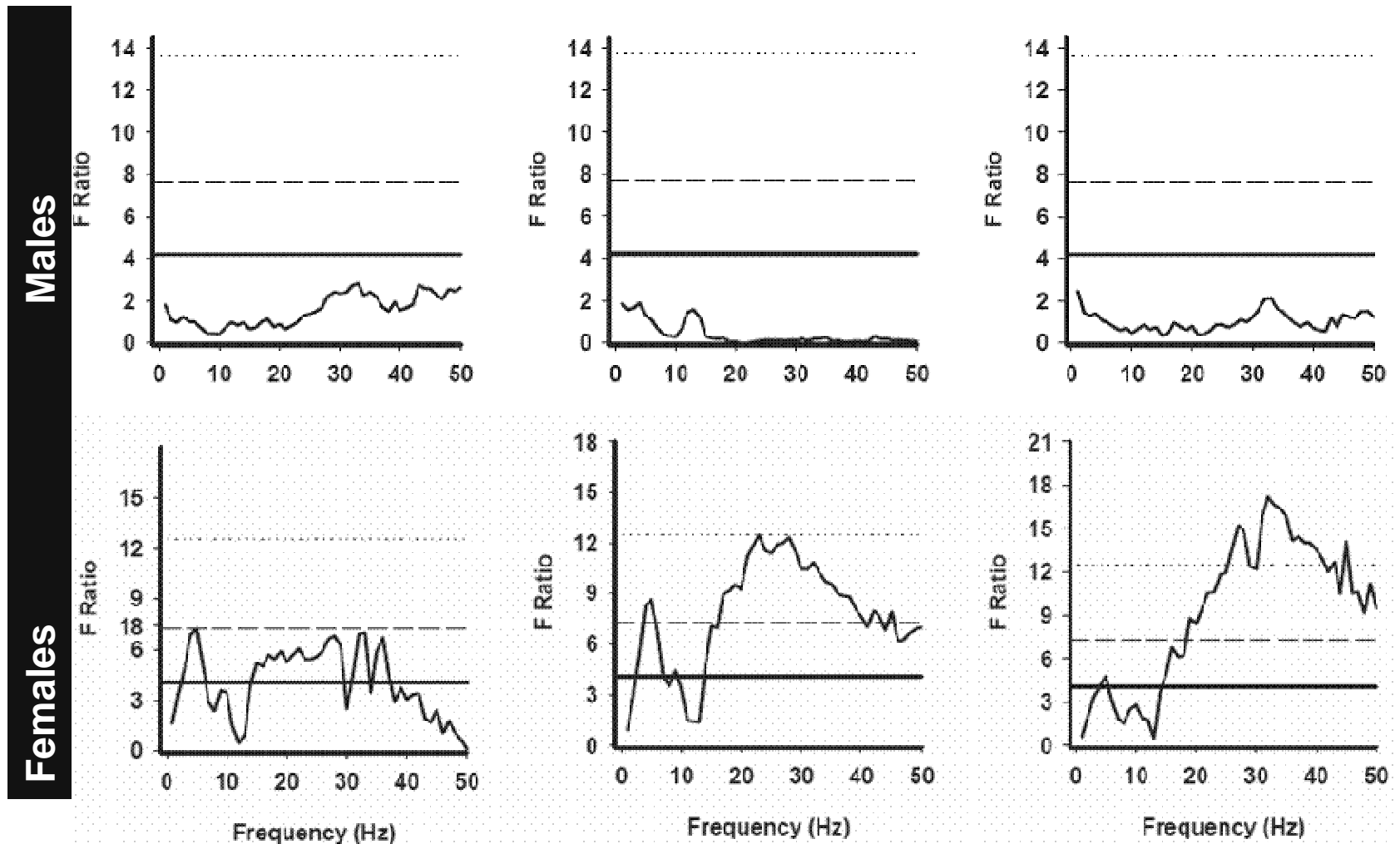


(Hypertension. 2005;46[part 2]:1016-1021.)

Are the ONLY relevant suspect?
Have focused on additional components of
to health and functioning:

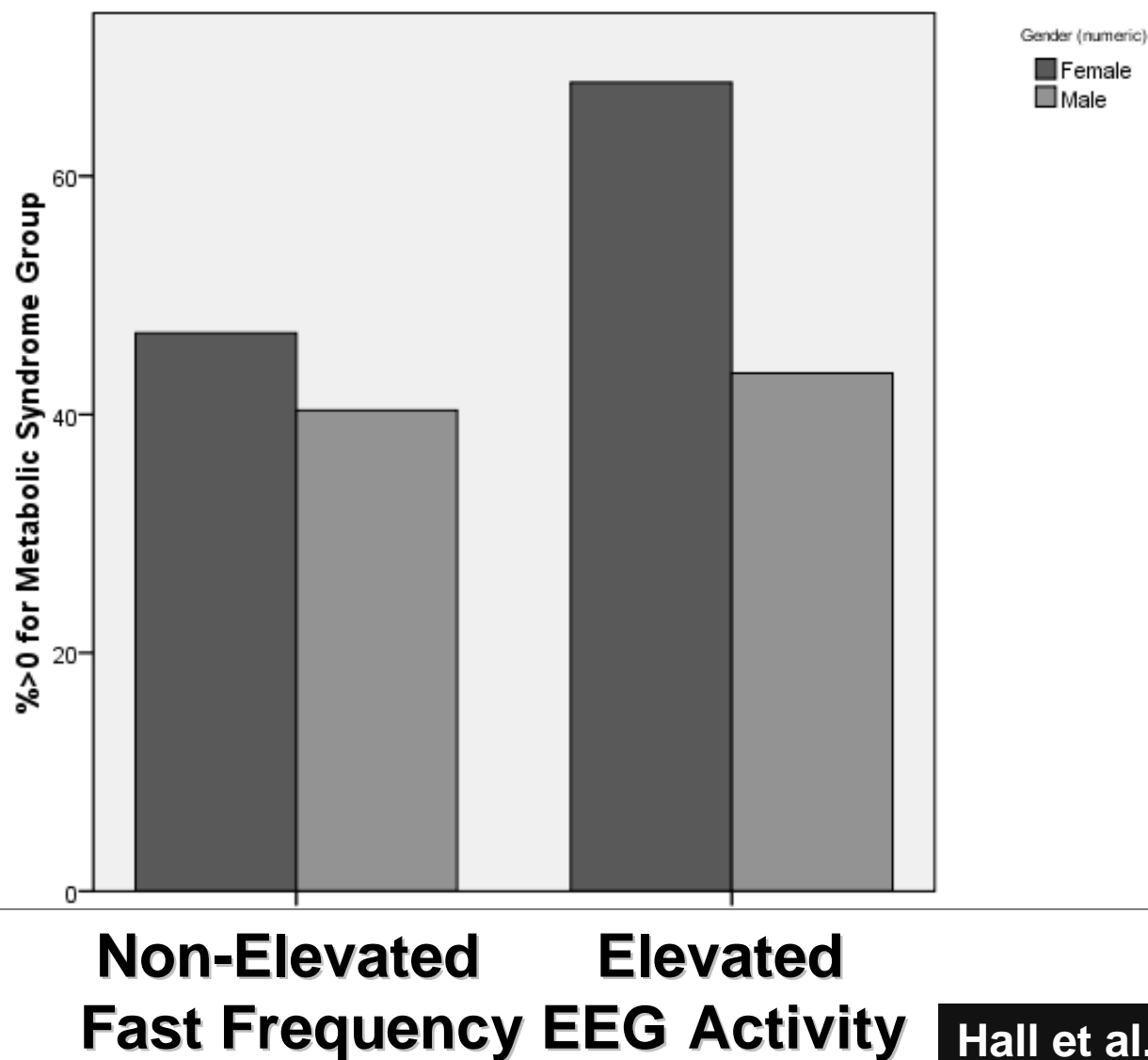
- q Subjective sleep quality
- q Short sleep
- q Fragmented sleep
- q Sleep depth
- q Cortical arousal during sleep

Sex differences in cortical arousal during sleep



Buyse, Germain, Hall et al., *Sleep*, 31(12):1673-82, 2008.

Metabolic syndrome is elevated in women with increased fast frequency EEG activity



Hall et al., under preparation

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Current:

- Sex differences not often considered**
- Assume that females “protected”**
- Assume understand influence of sex by curve
“shifting”**

Promising directions:

- real-time evaluation of sleep and physiology**
HPA and SAM activation, autonomic imbalance, inflammation
- studies in habitual environment**
- inter-disciplinary collaborations**
accelerated aging (cellular & molecular), allostatic load