ARIC Manuscript Proposal #779S

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(SHHS Manuscript/Abstract Proposal (2/14/01--revised per P&P 2/27/01))

1. a. *Full Title*: Associations Between Gender and Measures of Excessive Daytime Sleepiness in the Sleep Heart Health Study

   b. *Abbreviated Title* (Length 26): Gender, Measurement, EDS

2. *Lead Author*: Carol M. Baldwin, RN, Ph.D.

3. *Timeline*: Target start-date in March 2001. Finish date will be as outlined assuming P&P approval.

4. *Rationale*: Baldwin et al. (2001) noted that measures used to assess excessive daytime sleepiness (EDS) in studies of sleep apnea, sleep symptoms, and gender required further investigation. In their quality of life analysis, the Epworth Sleepiness Scale (ESS) was chosen as a measure of subjective sleepiness as it has been the most commonly used measure in similar studies (Gottlieb et al., 1999). Using an ESS $\geq$ 11 as the indicator of EDS, Baldwin et al. (2001), found that men (29.6%) were significantly more likely to report EDS compared to women (20.4%) ($p<0.05$). However, gender differences were noted in prevalence rates for EDS (23.8% in women, 19.2% in men, $p<0.05$) as defined by other items on the SHHS Sleep Habits Questionnaire (SHQ), which have been used in several other large-scale epidemiological studies of sleep disorders (Bixler et al., 1979; Karacan et al., 1976). These findings suggest different concordance rates between the ESS and the SHQ EDS measures for men and women. A possible reason for this discrepancy might be that the SHQ may be measuring different constructs of daytime sleepiness that are more relevant to insomnia and/or female gender, while the ESS assesses constructs that may be more relevant to men. This study will address these measurement issues to more adequately and appropriately assess sleepiness and gender, particularly in view of the fact that EDS has traditionally been strongly associated with SDB (Gottlieb et al., 1999; Johns, 1993), a sleep disorder more common in men.

5. *Main Hypothesis* (**Research Question**): In a large population, will sleep disordered breathing and its correlates, as well as difficulty initiating and maintaining sleep (DIMS) be differentially associated with the ESS and the SHQ EDS stratified by gender in the Sleep Heart Health Study?

6. *Data* (variables, time window, source, inclusions/exclusions): Demographics, RDI, snoring, sleep efficiency, arousal index, sleep stage changes, sleep symptoms (including the EDS questions on the SHQ), ESS scores, SES, BMI, smoking, alcohol/drug use, cardiovascular and pulmonary conditions from the original SHHS data collection (1994-1999).

7. *Type of Study*: Secondary Study

8. *Type of Publication*: Journal Article; Target Journal: Sleep

9. *Analysis Responsibility*: Local (Catharine J. Holberg, Ph.D., epidemiology, biostatistics; and Carol M. Baldwin, RN, Ph.D.)

10. *Introduction*: Men and women may perceive and report daytime sleepiness differently (Baldwin et al., 2001). Traditionally, the ESS has been used as the "gold standard" for assessing EDS, particularly associated with sleep-disordered breathing (SDB) (Johns, 1993). Chervin and Aldrich (1999), however, found that male gender had greater influence on the ESS than did SDB severity, even after adjusting for confounds. These reports indicate that the construct of daytime sleepiness has not been adequately examined in terms of gender in its association with DIMS or SDB.

11. *Brief Analysis Plan*: Independent Variables: ESS and SHQ EDS scores stratified by gender. *Dependent Variables*: RDI 4% for mild (5-14), moderate (15-29), and severe (30+) SDB, total sleep time, number of sleep to awake shifts, percent time in desaturation <90%, scores for difficulty initiating and maintaining sleep (DIMS), and loudness of snoring. Confounds/Effect modifiers will include ethnicity, marital status, education, age, smoking status, BMI, alcohol intake, use of sleep medications, and cardiovascular and respiratory conditions. Multivariate analysis will include log-linear analysis of logistic regression.

12. *Summary Section*: The results of this study will 1) determine if there is a need for gender specific assessment of EDS (or a weighted measure); and 2) provide an important contribution to our understanding of EDS and gender.

13. *References*:

- Baldwin CM, et al. (2001). The associations of sleep disordered breathing and sleep symptoms with quality of life in the Sleep Heart Health Study. Sleep 24:96-105.
- Bixler EO, et al. (1979). Prevalence of sleep disorders in the Los Angeles metropolitan area. Am J Psychiatry 136"1257-1262.
- Chervin RD, Aldrich MS. (1999). The Epworth Sleepiness Scale may not reflect objective measures of sleepiness or sleep apnea. Neurology 52:125-131.
- Gottlieb DJ, et al. (1999). Relation of sleepiness to respiratory disturbance index. Am J Respir Crit Care Med 159:502-507.
- Johns MW. (1993). Daytime sleepiness, snoring, and obstructive sleep apnea. The Epworth Sleepiness Scale. Chest 103:30-36.
- Karacan I, et al. (1976). Prevalence of sleep disturbance in primarily urban Florida county. Soc Sci Med 10: 239-244.