

Insomnia Symptoms in a Multiethnic Sample of American Women

GIARDIN JEAN-LOUIS, Ph.D.,^{1,2,3} CAROL MAGAI, Ph.D.,⁴ GEORGES J. CASIMIR, M.D.,^{1,3}
FERDINAND ZIZI, M.B.A.,^{1,2,3} FRANTZ MOISE, M.D.,³ DEXTER MCKENZIE, M.D.,^{3,5}
and YVONNE GRAHAM, M.P.H.^{3,5}

ABSTRACT

Background: Ethnic disparities in socioeconomic factors, risk markers, and coping styles affect health status. This study examined whether those factors influence insomnia symptoms in a multiethnic sample of urban American women.

Methods: Women ($n = 1440$, average age = 59.5 ± 6.45 years) participating in the study were recruited using a stratified, cluster sampling technique. The sample comprises African Americans (22%), English-speaking Caribbeans (22%), Haitians (22%), Dominicans (12%), Eastern Europeans (11%), and European Americans (11%). Trained staff conducted face-to-face interviews lasting 1.5 hours acquiring demographic, health, and sleep data.

Results: Analysis indicated significant ethnic differences in socioeconomic, risk markers, and health characteristics. The prevalence of insomnia symptoms (defined as either difficulty initiating sleep, difficulty maintaining sleep, or early morning awakening) among African Americans was 71%, English-speaking Caribbeans 34%, Haitians 33%, Dominicans 73%, Eastern Europeans 77%, and European Americans 70%. Hierarchical regression results showed that ethnicity explained 20% of the variance in the insomnia variable. Sociodemographic factors explained 5% of the variance, risk markers explained 5%, medical factors 20%, and coping styles 1%. Goodness-of-fit test indicated the model was reliable [$\chi^2 = 276$, $p < 0.001$], explaining 51% of the variance.

Conclusions: Findings show interethnic heterogeneity in insomnia symptoms, even among groups previously assumed to be homogeneous. Different factors seemingly influence rates of insomnia symptoms within each ethnic group examined. These findings have direct relevance in the management of sleep problems among women of different ethnic backgrounds. Understanding of ethnic/cultural factors affecting the sleep experience is important in interpreting subjective sleep data.

¹Departments of Neurology and Ophthalmology and ²Brooklyn Center for Health Disparities, SUNY Downstate Medical Center, Brooklyn, New York.

³Brooklyn Research Foundation on Minority Health, Kingsbrook Jewish Medical Center, Brooklyn, New York.

⁴Department of Psychology, Long Island University, Brooklyn, New York.

⁵Provident Clinical Society, Brooklyn, New York.

This research was supported by funds from the National Institutes of Health (SO6 GM54650 and 1R24MD001090).

INTRODUCTION

WITHIN THE PURVIEW OF CULTURE, which is inextricably linked to one's ethnicity, accumulating evidence suggests that sleep profiles might differ between individuals from different countries or ethnic backgrounds. Focusing on the two most commonly reported insomnia symptoms, difficulty initiating sleep (DIS) and difficulty maintaining sleep (DMS), epidemiological evidence shows that 32.2% of Americans ≥ 18 years old report either of these complaints.¹ Compared with the two countries neighboring the United States, Canada and Mexico, rates of DIS and DMS there are notably lower. Among Canadians of comparable ages, 10.9% reported these complaints.² In Mexico, 16.4% of adults surveyed reported being bothered by either DIS or DMS.³

Other epidemiological data show that in France, 20.0% of adults reported DIS or DMS,⁴ and in the United Kingdom, rates of insomnia symptoms accompanied by sleep dissatisfaction may be as low as 8.7%.⁵ In China, rates of DIS and DMS are estimated to be 11.4%,⁶ in Japan, they are 23.3%,⁷ and in South Korea, they are 15.5%.⁸ It would appear that American adults are experiencing greater sleep problems relative to Canadian, Mexican, British, French, Chinese, Japanese, and South Korean men and women.

The possibility that the sleep experience might differ across countries was explored further in a population-based study investigating the prevalence of nonrestorative sleep.⁹ Aside from the obvious fact that the variable of interest in that study was different from the ones used in the aforementioned studies, it sampled individuals representative of seven European countries: France, the U.K., Germany, Italy, Portugal, Spain, and Finland. Using the Sleep-EVAL system,¹⁰ which assesses sleep disorders via telephone interviews, it was found that nonrestorative sleep is a frequent symptom among European men and women (10.8%), but prevalence rates differed between countries. The U.K., for example, had the highest prevalence rate of nonrestorative sleep (16.1%), whereas Spain had the lowest rate (2.4%). As those countries share similar historical and cultural experiences, one might have expected negligible differences in sleep profiles between them.

We could not perform a direct comparison between the aforementioned studies because of inherent methodological differences, including dif-

ferent sampling strategies, varying cohorts, nuances in the outcome measures, and diverse definitions of insomnia. Thus, those rates cannot be used in a head-to-head match. It is of interest to determine if differences in prevalence rates would hold were the same methodology used across studies. New guidelines established by the American Academy of Sleep Medicine hopefully will increase concordance in data from epidemiological studies.¹¹ It is plausible that discrepancies in those rates might reflect subtle sociocultural influences on sleep in the populations surveyed. Factors influencing rates of sleep disturbances in this context could include lifestyle (exercise habits), labor force participation or career type, vacation time, length of work day or work week, as well as psychological factors.

Whereas there is a body of epidemiological studies permitting the examination of insomnia symptoms of individuals in diverse countries, there is a scarcity of prevalence data on interethnic differences. Several studies have ascertained biethnic differences in the sleep profile of Americans, but most comparative studies have been limited to respondents of the black and white ethnicities, favoring fewer insomnia symptoms for blacks overall.^{1,12-18} Much less has been done to investigate sleep profile among women of varying ethnic or cultural backgrounds.

The purpose of this study was to compare rates of insomnia symptoms in a multiethnic sample of urban American women. Recent focus on women's sleep is guided by emerging interest in how their sleep is affected by the interactions of biology, medical conditions, lifestyle, and societal roles. Inadequate sleep among midlife women triggers a number of negative health outcomes, suboptimal performance, and reduced quality of life. It is also associated with psychiatric morbidity, immunosuppression, and increased vulnerability to illnesses.¹⁹⁻²⁵ Interactions between sleep and health are examined in the Study of Women's Health Across the Nation (SWAN), a multiethnic, cross-sectional survey of women aged 40-55 years old. Analysis of SWAN data demonstrated that 38% of respondents reported sleep difficulty one to four times a week.^{26,27} This is in tandem with results of the 2007 Sleep in America Poll, which indicated that 40% of women report sleep problems a few nights a week.²⁸

Consistent with evidence of ethnic differences in numerous physical illnesses, risk markers, and vasomotor symptoms (e.g., hot flashes and night

TABLE 1. DEMOGRAPHIC RISK MARKERS OF RESPONDENTS BASED ON ETHNICITY^a

Variable	African American (n = 303)	English-speaking Caribbean (n = 304)	Haitian (n = 309)	Dominican (n = 165)	Eastern European (n = 156)	European American (n = 157)	F/chi-square	Post hoc comparisons ^b
Mean age, years	58.9 ± 6.2	58.4 ± 7.0	60.4 ± 6.5	58.3 ± 6.1	60.9 ± 6.1	59.6 ± 6.5	6.1*	H, EE > AA, ED, and D
Mean income, ¶K	30.0 ± 26.5	34.9 ± 20.3	22.5 ± 15.5	25.3 ± 14.5	30.1 ± 22.7	46.3 ± 34.6	26.5**	EA > all; EC > H, D; EE > H
Mean education, years	13.5 ± 12.1	13.3 ± 8.3	7.4 ± 8.1	7.2 ± 8.2	16.2 ± 13.0	14.3 ± 13.1	194.4**	EE > all, EA, AA, and EC > H and D
BMI (kg/m ²)	30.9 ± 6.6	29.7 ± 4.5	28.8 ± 5.0	28.5 ± 5.0	29.2 ± 6.3	27.5 ± 5.7	10.8**	AA > H, D, EE, and EA; EC > EA
Stress (0-29)	8.6 ± 6.2	10.9 ± 6.4	8.5 ± 6.9	11.7 ± 5.4	10.9 ± 6.0	8.8 ± 5.1	12.3**	AA < EC, D, and EE; EC > EA; H > D and EE; D > EA; EE > EA
Smoking (%)	27	5	2	10	8	12	117**	AA > ALL; D > EC and H; EA > EC, H, and EE; EE > H
Drinking (%)	36	15	4	39	24	46	166**	EA > ALL; AA and D > EC, H, and EE; EC > H

^aEthnic differences in demographic factors and risk markers were assessed with ANOVA/Fisher's exact tests.

^bAA, U.S.-born African American; EC, English-speaking Caribbean; H, Haitian; D, Dominican; EE, Eastern European; EA, U.S.-born European American.

p* < 0.05; *p* < 0.01.

sweats) associated with inadequate sleep,^{29–36} we hypothesized that the prevalence of insomnia symptoms would differ as a function of women's ethnicity. Furthermore, we assessed whether women's socioeconomic status, risk markers, physical health characteristics, and coping styles could explain differing rates of insomnia symptoms. These factors have empirical and theoretical importance in understanding relationships between insomnia and health measures, functioning either as mediating or confounding variables.

MATERIALS AND METHODS

Women ($n = 1440$) participating in the study were community-based residents with self-ascribed ethnic identity as U.S.-born blacks African Americans (22%), English-speaking Caribbeans (22%), Haitians (22%), Dominicans (12%), Eastern Europeans (11%), and U.S.-born whites European Americans (11%). Demographic characteristics of the sample are reported in Table 1; 36 women were excluded as they did not fall into any of the designated ethnic groupings. Participants were recruited using a stratified, cluster sampling technique. Initially, data on census blocks were gathered from the Household Income and Race Summary Tape file 3A of the Census files. Blocks were then stratified by ethnic group (blacks, whites, and Hispanics) and by income (high, medium, and low). Random selection without replacement was used to choose samples of block groups from each stratum, and only women who were ≥ 50 years old were recruited.

During face-to-face interviews lasting approximately $1\frac{1}{2}$ hours trained interviewers of the same ethnicity as the participants gathered data to achieve the aims of the study. Interviews were conducted either in the respondent's home or at another location of her choice. Participants received \$25 upon completion of the interview. Several scales/questionnaires were administered in a standard order to elicit subjective and demographic data. Physical health was measured with the Comprehensive Assessment and Referral Evaluation (CARE). Measures for the present analysis included demographic, health, risk markers, and sleep complaints.

The CARE is a standard instrument used to assess physical health, particularly among individuals in minority communities. Psychometric studies have shown that it has good construct va-

lidity³⁷ as well as concurrent and predictive validity.³⁸ Subscales considered in our analyses are somatic, sleep disorder, leg problem, heart disease, respiratory disease, arthritis, vision problem, and hypertension (Cronbach $\alpha = 0.86, 0.85, 0.86, 0.83, 0.72, 0.91, 0.85,$ and $0.92,$ respectively). Items from the subscales were not aggregated, as the analysis focused only on the presence or absence of symptoms of medical conditions. Thus, rates of medical problems may not of necessity reflect physician-diagnosed illnesses.

The sleep disorder subscale includes five questions: "Do you depend on medicine to sleep?" "Do you have difficulty falling asleep?" "Do you wake up often during the night?" "Do you wake up early and wake up feeling tired?" "Do you sleep during the day?" The present analysis considers the three most commonly used insomnia symptoms, namely, difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS), and early morning awakening. Thus, the insomnia symptom variable represents an aggregate of these three complaints. Women were categorized into two groups: those who experienced any of the three symptoms vs. those who did not. No formal insomnia diagnosis could be formulated, as data on frequency, duration, or severity were not elicited. The variables daytime sleep (nap) and use of sleep medicine were used simply in comparative analyses. They were not considered in the final statistical model, as they have low predictive power in ascertaining the presence of insomnia.

The stress index scale used initially by the National Survey of Black Americans was administered to our participants.³⁹ Respondents rated on a 4-point scale the degree to which a set of items provoked stress in the past month or two. These stress-induced life events were health, money, job, problems with family or marriage, problems with people outside the family, children, crime, police, love life, and racial conflict. Scores ranged from 0 to 29, and higher scores indicated greater stress levels ($\alpha = 0.81$).

Statistical analysis

For sample description, frequency and measures of central tendency were used. Variables were examined for normality and tested for collinearity, and skewed distributions were transformed using appropriate statistical techniques. Analysis of variance (ANOVA) was used to as-

sess ethnic differences in continuous variables. Fisher's exact test was used to assess ethnic differences in insomnia symptoms, risk markers, and physical health characteristics.

To examine which factors were predictive of the dependent variable, insomnia symptom, we employed a hierarchical logistic regression model. The dependent variable was a binary insomnia measure, classifying women into two groups: those reporting any of the three insomnia symptoms vs. those reporting no symptoms. This statistical modeling technique yields the proportion of variance in the dependent variable that can be explained by an additional set of factors over and above that explained by the initial set. In the present analyses, the initial set comprised the ethnicity factors (dummy coded). Four other sets of factors, sociodemographic (i.e., age, education, and income), risk markers (i.e., body mass index [BMI], smoking, drinking, and stress), medical (i.e., somatic, heart disease, respiratory disease, arthritis, leg problem, vision problem, and hypertension), and coping (i.e., beliefs and attitudes), were entered in a stepwise manner. Other factors, such as duration of residence in the United States, marital status, use of herbal medicine, access to healthcare (anchored by regular physical examination), did not show significant relationships with the dependent variable in preliminary analyses; thus, they were not included in the final model.

RESULTS

Significant ethnic differences were observed comparing women's age, income, and education levels (Table 1). Likewise, risk markers for insomnia symptoms also showed significant ethnic effects. Rates of health characteristics of the sample are compared in Table 2. Overall, 56% of the sample reported an insomnia symptom, defined as either DIS, DIM, or early morning awakening. Of the women experiencing sleep problems, 7% reported daytime naps and 9% used sleep medications. The prevalence of insomnia symptoms among African Americans was 71%, among English-speaking Caribbeans was 34%, among Haitians was 33%, among Dominicans was 73%, among Eastern Europeans was 77%, and among European Americans was 70%. Rates of specific insomnia-related symptoms for each ethnic group are presented in Table 3.

Results of the hierarchical regression model are presented in Table 4. Analysis showed that the ethnicity factors explained 20% of the variance in the insomnia variable. Sequential addition of the sociodemographic set explained 5% of the variance. With the addition of the risk markers to the model, an additional 5% of the variance was explained. When the medical factors were entered, an additional 20% of the variance was explained. Belief that prayer is the best way to cope contributed 1% of the variance. The omnibus chi-square goodness-of-fit test showed the expanded model was reliable (chi-square = 276, $p < 0.001$), explaining 51% of the variance in the insomnia variable overall.

Because ethnic disparities were noted in sociodemographics, risk markers, and medical factors, we tested the logistic regression model within each ethnicity to assess which factors were predictive of insomnia symptoms. Within the African American stratum, income, social drinking, somatic complaints, arthritis, leg problems, and belief that prayer is the best way to cope were significant predictors (chi-square = 87; $p < 0.0001$). For English-speaking Caribbeans, significant predictors were income, social drinking, heart diseases, arthritis, leg problems, and help from a spiritual healer (chi-square = 101; $p < 0.0001$). For Haitians, significant predictors were age, stress, somatic complaints, visual impairment, and leg problems (chi-square = 45, $p < 0.0001$). For Dominicans, they were smoking, stress, and respiratory diseases; the expanded model was somewhat unstable (chi-square = 7.19, NS). For Eastern Europeans, arthritis and hypertension were significant predictors (chi-square = 18, $p < 0.01$), and for European Americans, significant predictors were arthritis and respiratory diseases (chi-square = 39, $p < 0.0001$).

DISCUSSION

Results of our study showed significant interethnic differences in the prevalence of insomnia symptoms, and factors affecting prevalence estimates were not common across ethnic groups. These findings are consistent with our initial observation of disparate rates of insomnia symptoms comparing black and white individuals.⁴⁰ In the previous study sampling relatively older men and women, 49.2% of African Americans reported insomnia symptoms. By contrast, 41.8% of

TABLE 2. COMPARISON OF HEALTH CHARACTERISTICS OF RESPONDENTS BASED ON ETHNICITY^a

Variable	African American	English-speaking Caribbean	Haitian	Dominican	Eastern European	European American	Chi-square	Comparison ^b
Somatic (%)	75	37	67	86	80	83	195**	EC < all; H < D, EE and EA; AA, D and EA
Respiratory disease (%)	55	16	15	61	47	59	243**	AA, D and EA > EC and H; EE > EC and H; EA and D > EE
Hypertension (%)	55	61	56	54	51	34	34**	EA < all
Heart disease (%)	48	20	54	58	75	36	162**	EE > all; AA, H and D > EC and EA; EA > EC
Arthritis (%)	73	51	77	80	79	67	73**	EC < ALL; EA < D and EE
Leg problem (%)	58	34	64	77	62	58	98**	D > all; EC < all
Vision problem (%)	59	35	67	9	22	32	228**	H > all; D < all; AA > EC, EE and EA; EC and EA > EE

^aEthnic differences in health characteristics were assessed using Fisher's exact tests. ** $p < 0.01$.

^bFor abbreviations, see Table 1.

TABLE 3. INSOMNIA SYMPTOMS OF RESPONDENTS BASED ON ETHNICITY^a

Variable	African American	English-speaking Caribbean	Haitian	Dominican	Eastern European	European American	Chi-square	Comparisons ^b
Difficulty initiating sleep (%)	21	9	19	35	53	28	195**	EE > all; EC < all; D > AA and H; EA > H
Difficulty maintaining sleep (%)	63	32	26	62	68	59	243**	EE > EC and H; AA and D > EC and H
Early morning awakening (%)	45	15	20	54	58	48	34**	EE > AA, EC and H; D > EC and H; EA and AA > EC and H
Daytime nap (%)	16	7	4	9	3	4	40**	AA > all; EC and D > H, EE, and EA
Sleep medicine (%)	5	1	4	22	26	13	60**	D and EE > all; EA > AA, EC, and H

^aEthnic differences in insomnia symptoms were assessed using Fisher's exact tests. ** $p < 0.01$.

^bFor abbreviations, see Table 1.

TABLE 4. ASSOCIATIONS OF SOCIODEMOGRAPHICS, RISK MARKERS, PHYSICAL HEALTH CHARACTERISTICS, AND COPING WITH INSOMNIA SYMPTOMS^a

<i>Variable</i>	<i>B</i>	<i>S.E.</i>	<i>Wald</i>
Ethnicity			
African American	-0.79	0.54	2.10
English-speaking Caribbean	-1.59	0.55	8.28**
Haitian	-2.82	0.56	25.44**
Dominican	-1.05	0.58	3.22
Eastern European	-0.70	0.57	1.50
European American	-0.75	0.56	1.78
Demographic			
Age	0.02	0.01	2.18
Education	0.08	0.08	0.92
Income	-0.08	0.02	11.24**
Risk marker			
Current smoking	-0.43	0.25	3.07*
Social drinking	0.72	0.18	15.67**
BMI	0.01	0.01	0.18
Stress	0.04	0.01	8.34**
Physical health			
Somatic	1.06	0.17	36.89**
Arthritis	0.80	0.17	21.27**
Hypertension	-0.20	0.18	1.23
Heart disease	0.54	0.19	8.15**
Vision problem	0.61	0.18	12.21**
Respiratory disease	0.50	0.17	9.00**
Leg problem	0.89	0.16	29.45**
Coping			
Belief in spiritual healer	0.03	0.17	1.04
Prayer, best way to cope	-0.60	0.21	8.02**

^aRegression coefficients of the insomnia symptom measure on ethnicity, demographic factors, risk markers, and physical health characteristics.

* $p < 0.05$; ** $p < 0.01$.

Caribbean Americans reported those symptoms. It bears noting that the Caribbean American sample in that study included volunteers originating from various Caribbean countries, but rigorous subgroup analyses could not be done because subsamples were inadequately powered. Within the white stratum itself, 87.3% of immigrants indicated at least one of those symptoms compared with 82.1% of European American respondents. Results were in tandem with published epidemiological data evidencing fewer insomnia symptoms for blacks in general.^{1,12-18}

It is evident that our sampling strategy did not promote recruitment of participants mirroring the actual representation of blacks and whites, broadly defined, in New York. Although our strategy limits the generalizability of the findings, it yielded adequate data to assess differences in physical health, risk markers, and insomnia symptoms among six ethnic groups that heretofore have received little empirical inquiry. Analy-

sis of the sleep data indicated that the prevalence of insomnia symptoms differed significantly as a function of respondent's ethnic origin or place of birth. Examination of differences between white and black respondents indicated that rates of insomnia symptoms among African Americans and Caribbean Americans were 71% and 47%, respectively. Among European Americans and Eastern Europeans, rates were 70% and 77%, respectively. Hence, observed rates for African Americans were surprisingly similar to rates provided by women of European descent, raising some doubt as to the accuracy of previous estimates.

We were surprised to have observed such discrepant results comparing reports of ethnic minorities. Rates of insomnia symptoms for Dominican women were remarkably similar to those of European and African American women. However, rates for Haitian and English-speaking Caribbean women were substantially lower than

for all other groups. We surmise that Haitians and English-speaking Caribbeans constitute a unique group insofar as insomnia symptoms are concerned. Future studies should investigate why those women reported so few symptoms overall. Besides the obvious differences in cultural backgrounds, which often affect health status,⁴¹⁻⁴⁴ the only factors discriminating Dominican and African American women from Haitian and English-speaking Caribbean women were greater risk profile (i.e., stress, smoking, and drinking) and more somatic complaints and respiratory diseases. Discrepancies could not be explained by differences in socioeconomic position,⁴⁵ although income is a key factor in ascertaining access to care.⁴⁶ These could not be attributed to duration of residence in the United States either, notwithstanding the finding that health status of foreign-born individuals declines commensurate with the number of years lived in the United States.⁴¹

These findings are important when considered in the context of epidemiological evidence showing fewer insomnia symptoms for blacks relative to whites. Plausibly, reports suggesting lower rates of insomnia symptoms for blacks are confounded by the inclusion of varying ethnic minorities in black samples who ostensibly experience less sleep problems than do African Americans as a subgroup. Unfortunately, we cannot discern the intraethnic composition of black strata available in the extant literature; such details are not readily available. Supposing that published results emanated from analysis of aggregate data of U.S.-born blacks (African Americans) and foreign-born blacks, rates of insomnia symptoms might have been underestimated. One hypothesis generated from this study is that African Americans might be as likely as European Americans to experience sleep problems. This hypothesis is supported by evidence from objective studies showing worse sleep patterns for blacks,⁴⁷⁻⁴⁹ with the notable caveat that blacks may have also been mischaracterized as African Americans. It seems prudent, however, that at least the ethnic origin of study participants be considered in any rigorous statistical analyses or interpretation of epidemiological sleep data.

Our analyses also revealed interethnic differences in the experience of daytime nap and consumption of sleep medicines. That we found little difference in daytime nap between European American and Eastern European women was not surprising. In previous studies, white partici-

pants have consistently reported fewer complaints of daytime nap relative to individuals from minority groups.^{33,50} It is not clear why more African American women than Haitian and English Caribbean women reported daytime naps. Napping among African Americans might reflect an attempt to compensate for lack of sleep at night.

The observation that white women in general reported higher rates of use of sleep medicine than blacks was not unexpected. Based on previous reports, blacks reported considerably lower use of prescription or over-the-counter (OTC) medications than did whites.⁵¹⁻⁵⁴ Low rate of sleep medicine consumption among English-speaking Caribbeans appears consistent with the finding that they reported fewer insomnia symptoms than women in every other group. It was surprising that the rate of sleep medicine use among Dominicans was higher than those of African Americans and Eastern Europeans, who were characterized by a considerably greater burden of insomnia symptoms. Consumption of sleep medicine among Dominicans was substantially greater than in all other minority groups. Parenthetically, these results were not confounded by differences in socioeconomic status.

Findings of the univariate analyses were consistent with results of the multivariate regression models. Application of the model to each ethnic group revealed that factors associated with insomnia symptoms were not consistent across groups. This suggests significant within-group heterogeneity in the sleep profile of women residing in Brooklyn, New York. It is important to ascertain whether these findings could be replicated in other U.S. geographic regions. This heterogeneity is in part explained by varying physical health characteristics and coping styles of these women. It was interesting that women's BMI did not have much of an effect in the analyses; this is likely because of its shared variance with other health proxy factors that proved significant in the model. It would be informative to ascertain if vasomotor symptoms, which are more prevalent in certain ethnic groups than others,³⁴⁻³⁶ would affect rates of insomnia symptoms.

Ethnic and cultural differences in the perception of the sleep experience might also contribute to the interethnic heterogeneity in reported insomnia symptoms. Whereas blacks generally underreport sleep problems possibly because of

their unique coping styles,^{55,56} they exhibit significant difficulty sleeping polysomnographically.^{18,47,57} Research shows that few blacks with sleep apnea have received treatment for sleep apnea,^{58,59} even though they are disproportionately burdened by this condition.⁵⁹ One implication of these observations is that management of sleep problems of women from different ethnic backgrounds might require tailored treatments that reflect the nuances of each group. Understanding of ethnic differences in sleep profile might lead to the development of new, innovative, culturally appropriate interventions that could help eradicate health disparities.

CONCLUSIONS

Although subjective sleep report is often unreliable when gauging objectively the sleep experience, it remains an important clinical tool in the assessment of overall health. Indeed, most epidemiological sleep studies have relied on subjective data for population-based estimates of the prevalence of insomnia symptoms. Inherent in such methodologies are a number of biases affecting such estimates. Subjective scales in our study, which primarily elicited symptoms of medical conditions, rather than physician-diagnosed illnesses, may have generated overestimation of some of the health problems of women in the sample. Factors influencing our data might include selection bias, social desirability, and self-perceived sleep need. It does not appear that observed ethnic differences in insomnia symptoms could be related to status differentials (e.g., age, education, or income). Our regression analyses, adjusting for 16 known covariates or risk markers, pointed to ethnicity as the most important predictor of the likelihood of reporting insomnia symptoms.

Arguably, a sizable portion of the variance in insomnia symptoms might be explainable by factors anchoring unique ethnic cultural heritage. That which constitutes normal, healthy, and desirable sleep among minority groups may not always correspond with norms established in mainstream cultures. Supporting this argument is evidence from a prevalence study conducted among New Zealanders. According to that study, surveying 4000 adults (20–59 years old), greater rates of insomnia symptoms were found among Maori relative to non-Maori respondents,⁶⁰ who

do not share similar cultural attitudes and spiritual beliefs. Likewise, distinct sociocultural norms and attitudes might account for differing rates of insomnia symptoms comparing adults living in European countries.⁹ Even in the realm of pediatric sleep research, there is evidence that sleep practices (e.g., cosleeping and bed sharing) are unique to the cultures in which they are embedded.⁶¹

Differences in prevalence estimates in our sample might be attributable in part to ethnic differences in cultural norms and attitudes toward sleep.^{42,60} Health beliefs, attitudes, values, and cognitive styles influence the sleep process, serving as risk markers for some ethnic groups while operating as protective factors for others.^{55,56} Evidence suggests that blacks may have developed cognitive strategies to cope with daily life challenges, which potentially confer positive adaptive advantages in addressing health-related problems.^{55,56,62} Future studies should explore whether the Dysfunctional Beliefs and Attitudes about Sleep scale⁶³ can be used to discriminate between individuals of different ethnic groups.

REFERENCES

1. Bixler EO, Kales A, Soldatos CR, Kales JD, Healey S. Prevalence of sleep disorders in the Los Angeles metropolitan area. *Am J Psychiatry* 1979;136:1257.
2. Ohayon MM, Caulet M, Guilleminault C. How a general population perceives its sleep and how this relates to the complaint of insomnia. *Sleep* 1997;20:715.
3. Tellez-Lopez A, Sanchez E, Torres, FG. Habitros y transtornos del dormir en residentes del area metropolitana de Monterrey. *Salud Mental* 1995;18:14.
4. Ohayon M, Caulet M, Lemoine P. The elderly, sleep habits and use of psychotropic drugs by the French population. *Encephale* 1996;22:337.
5. Ohayon MM, Guilleminault C, Priest RG, Caulet M. Snoring and breathing pauses during sleep: Telephone interview survey of a United Kingdom population sample. *BMJ* 1997;314:860.
6. Li RH, Wing YK, Ho SC, Fong SY. Gender differences in insomnia—A study in the Hong Kong Chinese population. *J Psychosom Res* 2002;53:601.
7. Kim K, Uchiyama M, Okawa M, Liu X, Ogihara R. An epidemiological study of insomnia among the Japanese general population. *Sleep* 2000;23:41.
8. Ohayon MM, Hong SC. Prevalence of insomnia and associated factors in South Korea. *J Psychosom Res* 2002;53:593.
9. Ohayon MM. Prevalence and correlates of non-restorative sleep complaints. *Arch Intern Med* 2005; 165:35.

10. Ohayon MM, Guilleminault C, Zulley J, Palombini L, Raab H. Validation of the sleep-EVAL system against clinical assessments of sleep disorders and polysomnographic data. *Sleep* 1999;22:925.
11. Edinger JD, Bonnet MH, Bootzin RR, et al. Derivation of research diagnostic criteria for insomnia: Report of an American Academy of Sleep Medicine Work Group. *Sleep* 2004;27:1567.
12. Whitney CW, Enright PL, Newman AB, Bonekat W, Foley D, Quan SF. Correlates of daytime sleepiness in 4578 elderly persons: The Cardiovascular Health Study. *Sleep* 1998;21:27.
13. Blazer DG, Hays JC, Foley DJ. Sleep complaints in older adults: A racial comparison. *J Gerontol A Biol Sci Med Sci* 1995;50:M280.
14. Karacan I, Thornby JI, Anch M, et al. Prevalence of sleep disturbance in a primarily urban Florida county. *Soc Sci Med* 1976;10:239.
15. Hicks RA, Lucero-Gorman K, Bautista J, Hicks GJ. Ethnicity, sleep hygiene knowledge, and sleep hygiene practices. *Percept Motor Skills* 1999;88:1095.
16. Hicks RA, Lucero-Gorman K, Bautista J, Hicks GJ. Ethnicity, sleep duration, and sleep satisfaction. *Percept Motor Skills* 1999;88:234.
17. DiPalma J, Jean-Louis G, Zizi F, et al. Self-reported sleep duration among college students: Consideration of ethnic differences. *Sleep* 2001;24:430.
18. Durrence HH, Lichstein KL. The sleep of African Americans: A comparative review. *Behav Sleep Med* 2006;4:29.
19. Taylor DJ, Mallory LJ, Lichstein KL, Durrence HH, Riedel BW, Bush AJ. Comorbidity of chronic insomnia with medical problems. *Sleep* 2007;30:213.
20. Kripke DF, Jean-Louis G, Elliott JA, et al. Ethnicity, sleep, mood, and illumination in postmenopausal women. *BMC Psychiatry* 2004;4:8.
21. Williams CJ, Hu FB, Patel SR, Mantzoros CS. Sleep duration and snoring in relation to biomarkers of cardiovascular disease risk among women with type 2 diabetes. *Diabetes Care* 2007;30:1233.
22. Jean-Louis G, Kripke DF, Ancoli-Israel S. Sleep and quality of well-being. *Sleep* 2000;23:1115.
23. Patel SR, Ayas NT, Malhotra MR, et al. A prospective study of sleep duration and mortality risk in women. *Sleep* 2004;27:440.
24. Dinges DF, Douglas SD, Zaugg L, et al. Leukocytosis and natural killer cell function parallel neurobehavioral fatigue induced by 64 hours of sleep deprivation. *J Clin Invest* 1994;93:1930.
25. Irwin M, Mascovich A, Gillin JC, Willoughby R, Pike J, Smith TL. Partial sleep deprivation reduces natural killer cell activity in humans. *Psychosom Med* 1994;56:493.
26. Kravitz HM, Ganz PA, Bromberger J, Powell LH, Sutton-Tyrrell K, Meyer PM. Sleep difficulty in women at midlife: A community survey of sleep and the menopausal transition. *Menopause* 2003;10:19.
27. Hollander LE, Freeman EW, Sammel MD, Berlin JA, Grisso JA, Battistini M. Sleep quality, estradiol levels, and behavioral factors in late reproductive age women. *Obstet Gynecol* 2001;98:391.
28. The National Sleep Foundation. Available at www.sleepfoundation.org/site/apps/nl/content2.asp?c=huIXKjM0lxF&b=2434067&ct=3618771 Accessed May 20, 2007.
29. Jean-Louis G, Zizi F, Clark LT, Kossotis J. Associations of sleep apnea to cardiovascular diseases: Role of diabetes and metabolic syndrome. In: Clark LT, ed. *Cardiovascular disease and diabetes: Contemporary management*. New York: McGraw-Hill, 2007:472.
30. Kuppermann M, Lubeck DP, Mazonson PD, et al. Sleep problems and their correlates in a working population. *J Gen Intern Med* 1995;10:25.
31. Habte-Gabr E, Wallace RB, Colsher PL, Hulbert JR, White LR, Smith IM. Sleep patterns in rural elders: Demographic, health, and psychobehavioral correlates. *J Clin Epidemiol* 1991;44:5.
32. Bliwise DL, King AC, Harris RB. Habitual sleep durations and health in a 50–65 year old population. *J Clin Epidemiol* 1994;47:35.
33. Qureshi AI, Giles WH, Croft JB, Bliwise DL. Habitual sleep patterns and risk for stroke and coronary heart disease: A 10-year follow-up from NHANES I. *Neurology* 1997;48:904.
34. Obermeyer CM, Reher D, Saliba M. Symptoms, menopause status, and country differences: A comparative analysis from DAMES. *Menopause* 2007;4:788.
35. Avis NE, Stellato R, Crawford S, et al. Is there a menopausal syndrome? Menopausal status and symptoms across racial/ethnic groups. *Soc Sci Med* 2001;52:345.
36. Grisso JA, Freeman EW, Maurin E, Garcia-Espana B, Berlin JA. Racial differences in menopause information and the experience of hot flashes. *J Gen Intern Med* 1999;14:98.
37. Teresi JA, Golden RR, Gurland BJ, Wilder DE, Bennett RG. Construct validity of indicator-scales developed from the Comprehensive Assessment and Referral Evaluation interview schedule. *J Gerontol* 1984;39:147.
38. Teresi JA, Golden RR, Gurland BJ. Concurrent and predictive validity of indicator scales developed for the Comprehensive Assessment and Referral Evaluation interview schedule. *J Gerontol* 1984;39:158.
39. Jackson JS, Brown TN, Williams DR, Torres M, Sellers SL, Brown K. Racism and the physical and mental health status of African Americans: A thirteen year national panel study. *Ethn Dis* 1996;6:132.
40. Jean-Louis G, Magai C, Cohen CI, et al. Ethnic differences in reported sleep problems in older adults. *Sleep* 2001;24:926.
41. Frieden T. The health of immigrants in New York City: A report from the New York City Department of Health and Mental Hygiene. *DHMH* 2006;1.
42. Koenig HG, George LK, Titus P. Religion, spirituality, and health in medically ill hospitalized older patients. *J Am Geriatr Soc* 2004;52:554.
43. Kagawa-Singer M, Blackhall LJ. Negotiating cross-cultural issues at the end of life: "You got to go where he lives." *JAMA* 2001;286:2993.
44. Goodwin JS, Black SA, Satish S. Aging versus disease: The opinions of older black, Hispanic, and non-Hispanic white Americans about the causes and treat-

- ment of common medical conditions. *J Am Geriatr Soc* 1999;47:973.
45. Gellis LA, Lichstein KL, Scarinci IC, et al. Socioeconomic status and insomnia. *J Abnorm Psychol* 2005;114:111.
 46. Penn NE, Kar S, Kramer J, Skinner J, Zambrana RE. Ethnic minorities, health care systems, and behavior. *Health Psychol* 1995;14:641.
 47. Ancoli-Israel S, Klauber MR, Stepnowsky C, Estline E, Chinn A, Fell R. Sleep-disordered breathing in African-American elderly. *J Gerontol* 1989;44:M18.
 48. Jean-Louis G, Kripke DF, Ancoli-Israel S, Klauber M, Sepulveda RS. Sleep duration, illumination, and activity patterns in a population sample: Effects of gender and ethnicity. *Biol Psychiatry* 2000;47:921.
 49. Redline S, Kirchner HL, Quan SF, Gottlieb DJ, Kapur V, Newman A. The effects of age, sex, ethnicity, and sleep-disordered breathing on sleep architecture. *Arch Intern Med* 2004;164:406.
 50. Ancoli-Israel S, Klauber MR, Stepnowsky C, Estline E, Chinn A, Fell R. Sleep-disordered breathing in African-American elderly. *Am J Respir Crit Care Med* 1995;152:1946.
 51. Hanlon JT, Fillenbaum GG, Burchett B, et al. Drug-use patterns among black and nonblack community-dwelling elderly. *Ann Pharmacother* 1992;26:679.
 52. Salber EJ, Greene SB, Gagnon P, Jones B. Black/white drug use patterns in rural North Carolina. *Comtemp Pharm Pract* 1979;2:4.
 53. Blazer D, Hybels C, Simonsick E, Hanlon JT. Sedative, hypnotic, and antianxiety medication use in an aging cohort over ten years: A racial comparison. *J Am Geriatr Soc* 2000;48:1073.
 54. Lukoschek P. African Americans' beliefs and attitudes regarding hypertension and its treatment: A qualitative study. *J Health Care Poor Underserved* 2003;14:566.
 55. Haley WE, Roth DL, Coletton MI, et al. Appraisal, coping, and social support as mediators of well-being in black and white family caregivers of patients with Alzheimer's disease. *J Consult Clin Psychol* 1996;64:121.
 56. Knight BG, McCallum TJ. Heart rate reactivity and depression in African-American and white dementia caregivers: Reporting bias or positive coping? *Aging Mental Health* 1998;2:212.
 57. Giles DE, Perlis ML, Reynolds CF, Kupfer DJ. EEG sleep in African-American patients with major depression: A historical case-control study. *Depress Anxiety* 1998;8:58.
 58. Jean-Louis G, Zizi F, Casimir G, DiPalma J, Mukherji R. Sleep-disordered breathing and hypertension among African Americans. *J Hum Hypertens* 2005;19:485.
 59. Redline S, Tishler P, Hans M, Tosteson T, Strohl K, Spry K. Racial differences in sleep-disordered breathing in African Americans and Caucasians. *Am J Respir Crit Care Med* 1997;155:186.
 60. Paine SJ, Gander PH, Harris R, Reid P. Who reports insomnia? Relationships with age, sex, ethnicity, and socioeconomic deprivation. *Sleep* 2004;27:1163.
 61. Klonoff-Cohen H, Edelstein SL. Bed sharing and the sudden infant death syndrome. *BMJ* 1995;311:1269.
 62. Jean-Louis G, Magai C, Consedine NS, et al. Insomnia symptoms and repressive coping in a sample of older black and white women. *BMC Womens Health* 2007;7:1.
 63. Carney CE, Edinger JD. Identifying critical beliefs about sleep in primary insomnia. *Sleep* 2006;29:444.

Address reprint requests to:

Girardin Jean-Louis, Ph.D.

Department of Ophthalmology (Box 58)

SUNY Downstate Medical Center

450 Clarkson Avenue

Brooklyn, NY 11203-2098

E-mail: gjean-louis@downstate.edu