

# Sleep Quality and Alcohol-Use Disorders in a Select Population of Young-Adult Mexican Americans\*

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**ABSTRACT. Objective:** Adult male Hispanics, particularly those born in the United States, are more likely to drink frequently and to consume larger quantities of alcohol than Whites or Blacks. Because alcohol and other substance-use disorders are frequently associated with disturbances in sleep, this study investigated measures of sleep quality and substance-use disorders in a select sample of young-adult Mexican Americans.

**Method:** Diagnoses of alcohol-use disorders and other psychiatric disorders (based on the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised), results from the Pittsburgh Sleep Quality Index (PSQI), family history of alcohol dependence, and measures of acculturation stress were obtained from 294 Mexican American young adults, ages 18-30, who were literate in English and were residing legally in San Diego County. **Results:** Lifetime diagnoses of alcohol-use disorders, family history of alcohol dependence, acculturation stress,

and lifetime diagnoses of major depressive disorder were all correlated with significantly poorer quality sleep as indexed by the global score on the PSQI. Regression analyses also revealed that gender was correlated with habitual bedtime, whereas drug dependence (cannabis, stimulants, and/or opiates) was significantly correlated with how long it took to fall asleep, major depressive disorder with the number of hours spent sleeping a night, and anxiety disorders and major depressive disorder with waking up in the early morning or middle of the night. **Conclusions:** These data suggest that alcohol-use disorders are significantly associated with poorer quality of sleep in this population of young adults and that substance-use disorders may affect different aspects of sleep than anxiety and depressive disorders do. These findings may be helpful in designing prevention and intervention programs for alcohol-use disorders in this high-risk population. (*J. Stud. Alcohol Drugs*, 71, 879-884, 2010)

**D**ATA ON DRINKING PATTERNS and problems between different racial/ethnic groups highlight the importance of studying the etiology of alcohol use and use disorders in different ethnic groups (Caetano et al., 2009; Dawson, 1998; Grant et al., 2004a, 2004b; Nielsen, 2000; Vaeth et al., 2009; Vega et al., 1998). Data from the National Epidemiologic Survey on Alcohol and Related Conditions demonstrate that the highest rates of 12-month alcohol dependence are found in Native Americans (6.4%), followed by Hispanics (4.0%) Whites (3.8%), Blacks (3.6%), and Asians (2.4%) (see Hasin et al., 2007). Within the Hispanic population, adult men, particularly those born in the United States, are more likely to drink frequently and to consume larger quantities of alcohol than Whites or Blacks (Caetano, 1984; Caetano and Kaskutas, 1995; Helzer et al., 1991; Reardon and Buka, 2002; Stinson et al., 1998). A consistent body of literature has demonstrated that, as Latino immigrants assimilate and spend more time in the United States, they are more likely to have risky health behaviors and negative health outcomes (see Lara et al., 2005, for a review).

Understanding the mechanisms mediating the effects of drinking and substance-use disorders on health outcomes such as sleep patterns in Hispanics is a research topic of considerable importance in view of the evidence supporting a relationship between sleep disturbances and alcohol consumption in the general population (Brower, 2001; Brower et al., 1998, 2001; Caetano et al., 1998; Clark et al., 1998, 1999; Crum et al., 2004a,b; Drummond et al., 1998; Foster and Peters, 1999; Gillin et al., 1994; Wong et al., 2004). There have been few studies investigating Hispanics and sleep. Some studies have found no difference in symptoms of insomnia between Hispanics and other ethnic groups (Ancoli-Israel and Roth, 1999; Roberts et al., 2006) or no differences between Hispanics and Whites (Ram et al., 2010). Other studies have reported that Hispanic women slept less than European American women (Kripke et al., 2004). In one study, Mexican Americans were found to have higher odds of long sleeping compared with Whites, but the association was no longer significant when the model was adjusted for socioeconomic characteristics (Hale and Do, 2007). However, in another study, Mexican American youths were found to be at elevated risk for hypersomnia compared with "Anglos" (Roberts et al., 2000). One reason that results may differ is that some studies have not differentiated between Mexican Americans that were born in the United States and those who are recent immigrants. None of these studies focused on the relationship between alcohol use and alcohol-use disorders and sleep quality.

The present study was designed to assess sleep quality

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and alcohol-use disorders in a select sample of young-adult Mexican Americans who were residing legally in the United States and could read and speak English. We have previously reported a relatively higher prevalence of alcohol dependence in this population and demonstrated an association between alcohol dependence, anxiety disorders, and acculturation stress (see Ehlers et al., 2009; Gilder et al., 2007). The present article extends those studies to the assessment of sleep quality as indexed by the Pittsburgh Sleep Quality Index (PSQI) and its association with substance-use disorders, acculturation stress, and affective and anxiety disorders.

### Method

The aim of the study was to assess sleep quality in young-adult Mexican Americans, likely to be second generation or more, from the community. Therefore, participants were recruited using a commercial mailing list that provided the addresses of individuals with Hispanic surnames in 11 ZIP codes in San Diego County, all of which had a population that was more than 20% Hispanic and were within 25 miles of the research site. The mailed invitation stated that potential participants must be of Mexican American heritage, between the ages of 18 and 30 years, residing in the United States legally, and able to read and write in English. Participants were excluded if they were pregnant, were nursing, or currently had a major medical or neurological disorder or head injury. Participants were asked to refrain from alcohol use or any other substance use for 24 hours before testing.

On the test day, after a complete description of the study to the participants, written informed consent was obtained using a protocol approved by the Institutional Review Board of The Scripps Research Institute. Information on demography, personal medical and psychiatric history, drinking history, and family history of alcohol and other substance dependence was obtained using a family history interview and the face-to-face Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA). There have been several studies that have evaluated the concurrent diagnostic validity of the SSAGA across alcohol and drug dependencies, major depression, anxiety disorders, and antisocial personality disorder (Bucholz et al., 1994; Hesselbrock et al., 1999). These findings indicate that the SSAGA is a highly reliable and valid instrument for use in studies of psychiatric disorders, including substance dependence.

Participants were eliminated from the current data analyses if they were taking psychoactive medication or had a positive breath alcohol test on the day of the evaluation. Lifetime history of alcohol or other drug dependence in this population was defined by the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R; American Psychiatric Association, 1994) criteria as originally formulated by the Collaborative Study on the Genetics of Alcoholism. Family history of alcohol depen-

dence was assessed using the Family History Assessment Module.

Diagnoses of lifetime alcohol dependence, nicotine dependence, other drug dependences, and other psychiatric disorders were made on the basis of DSM-III-R criteria generated by the SSAGA. Four anxiety disorders (panic disorder with or without agoraphobia, agoraphobia without panic, social phobia, and obsessive-compulsive disorder), posttraumatic stress disorder, and major depressive disorder were evaluated. Because of the difficulties in diagnosing hypomania, bipolar II disorder was included with major depressive disorder as a single major depressive disorder category. Diagnosis of drug dependence was made if the participant met criteria for dependence on one or more of the following substances: cannabis, cocaine, stimulants, sedatives, opiates, phencyclidine (PCP), hallucinogens, or solvents.

Level of acculturation stress was assessed using an instrument developed by Caetano and colleagues using items from Mena and colleagues' (1987) scale of acculturative stress, Vega and colleagues' (1993) scale of acculturative stress, and additional items. Sleep quality was indexed by the PSQI. The PSQI consists of 19 items that produce a global sleep quality score as well as individual items such as usual bedtime, wake-up time, actual hours slept, number of minutes to fall asleep, and nighttime awakenings. Global PSQI score was estimated for each participant as described previously (Buysse et al., 1989). The psychometric properties of the PSQI have been described previously (Carpenter and Andrykowski, 1998).

### Data analyses

Data analyses focused on specific aims generated based on previous research investigating alcohol-use disorders and acculturation stress in this population. The first aim was to investigate the relationship between the total score on the PSQI and lifetime diagnoses of DSM-III-R alcohol-use disorder (abuse and/or dependence). Additionally, associations between gender, family history of alcohol dependence, nicotine dependence, other drug dependence, anxiety disorder, posttraumatic stress disorder, major depressive disorder, and acculturation stress (using median split) and the PSQI were investigated. Analysis of variance (ANOVA) was used to determine significant associations. Significant variables from the ANOVA were then entered into a forward stepwise regression, with gender, to determine which variables were retained by the final model. The second aim was to assess whether individual items from the PSQI differentiated among the disorders. For these analyses, associations between the first five items on the PSQI (routine bedtime, time to fall asleep, wake-up time, hours of sleep a night, wake up early/middle of the night) and gender, alcohol-use disorders, nicotine dependence, other drug dependence, acculturation stress, anxiety disorder, and major depressive disorder were

evaluated. For these analyses, ANOVA was used, and the significant variables were then entered into a forward stepwise regression, with gender, to determine which variables were retained by the final model.

Comparisons between demographics, the PSQI, psychiatric diagnoses, and acculturation stress were conducted using ANOVA for continuous variables and chi-square analyses for dichotomous variables. Statistical significance was set at the probability level  $p > .05$ . Power analyses indicated there was sufficient power (.80) at  $\alpha = .05$  to detect differences in our primary analyses, for a medium effect size.

## Results

The young adults who participated in the study included 59% women and the sample had a mean age of 23 years ( $SD = 3.9$ ). There were no significant differences in age, number of years of education ( $M = 13.3$  years,  $SD = 0.1$ ), employment (67.7%), marriage status (18.4%), or nicotine dependence (11%) between men and women. There were no significant differences in global PSQI score or any of the demographic variables. Men were more likely to have an alcohol-use disorder ( $n = 68$ ; 57%) than women ( $n = 70$ ; 40%),  $\chi^2(1) = 4.85$ ,  $p < .03$ . Men were not more likely to have a drug dependence (opiate, stimulants, cannabis) ( $n = 40$ ; 34%) than women ( $n = 41$ ; 23%). Women were more likely to have experienced a major depressive episode ( $n = 75$ ; 42%) than men ( $n = 34$ ; 29%),  $\chi^2(1) = 6.2$ ,  $p < .01$ . However, there were no differences in the rates of "any anxiety disorder" between men ( $n = 23$ ; 19%) and women ( $n = 37$ ; 21%).

The first aim was to investigate the relationship between

the total score on the PSQI and lifetime diagnoses of alcohol-use disorders. Associations between gender, family history of alcohol dependence, acculturation stress, lifetime diagnoses of nicotine dependence, other drug dependence, anxiety disorder, posttraumatic stress disorder, and major depressive disorder and the PSQI were also investigated. As seen in Table 1, a significant association was found between the global score on the PSQI and alcohol-use disorders,  $F(1, 293) = 9.56$ ,  $p < .002$ . Gender was not significantly associated with global PSQI score. Global score on the PSQI was also found to be significantly associated with family history of alcohol dependence,  $F(1, 281) = 7.34$ ,  $p < .007$ ; a lifetime diagnosis of other drug dependence,  $F(1, 282) = 5.41$ ,  $p < .021$ ; any anxiety disorder,  $F(1, 293) = 5.852$ ,  $p < .016$ ; major depressive episode,  $F(1, 293) = 15.16$ ,  $p < .001$ ; and acculturation stress,  $F(1, 293) = 8.243$ ,  $p < .004$ . A forward stepwise regression analysis with gender revealed that alcohol-use disorder ( $t = 2.47$ ,  $p < .014$ ), family history ( $t = 2.33$ ,  $p < .021$ ), major depression ( $t = 3.14$ ,  $p < .002$ ), and acculturation stress ( $t = -2.5$ ,  $p < .014$ ) remained significant in the final model.

The second research question sought to determine if the first five items on the PSQI (routine bedtime, time to fall asleep, usual wake-up time, hours of sleep a night, wake up early morning/middle of night) were selectively associated with the following: lifetime diagnosis of alcohol-use disorders, family history of alcohol dependence, gender, acculturation stress, and/or lifetime diagnoses of nicotine dependence, other drug dependence (cannabis, opiates, and/or stimulants), anxiety disorder, and major depressive disorder in this Mexican American population. As seen in Table 1, gender,  $F(1, 293) = 6.7$ ,  $p < .01$ , and alcohol-use disorders,

TABLE 1. Pittsburgh Sleep Quality Index (PSQI) mean values in Mexican Americans ( $n = 294$ )

Variable	1 Usual bedtime	2 Time to fall asleep (in minutes)	3 Usual wake up time	4 Hours spent asleep	5 PSQI Global Score
Gender					
Male	11:21 P.M.*	21.70	7:19 A.M.	7.17	4.35
Female	10:58 P.M.	22.01	7:19 A.M.	7.38	4.66
Alcohol-use disorder					
No	10:58 P.M.*	19.38*	7:11 A.M.	7.35	4.05*
Yes	11:17 P.M.	24.64	7:26 A.M.	7.23	5.07
MDD					
No	11:04 P.M.	21.02	7:25 A.M.	7.50*	4.05*
Yes	11:11 P.M.	23.33	7:08 A.M.	6.93	5.36
Any anxiety disorder					
No	11:07 P.M.	21.44	7:20 A.M.	7.32	4.33*
Yes	11:07 P.M.	23.68	7:13 A.M.	7.21	5.33
Acculturation stress					
No	11:01 P.M.	19.07*	7:07 A.M.	7.29	4.05*
Yes	11:11 P.M.	24.73	7:25 A.M.	7.28	5.02
Other drug dependence					
No	11:09 P.M.	18.86*	7:27 A.M.	7.26	4.30*
Yes	11:18 P.M.	29.80	7:39 A.M.	7.38	5.17

Note: MDD = major depressive disorder.

\* $p < .05$

$F(1, 293) = 4.38, p < .037$ , were found to be significantly associated with usual bedtime, although forward stepwise regression revealed that only gender was significantly retained in the final model ( $t = -2.59, p < .01$ ). The amount of time it took to fall asleep was found to be significantly associated with family history of alcohol dependence,  $F(1, 284) = 6.4, p < .012$ ; alcohol-use disorders,  $F(1, 285) = 5.08, p < .025$ ; nicotine dependence,  $F(1, 285) = 5.98, p < .015$ ; other drug dependence,  $F(1, 285) = 18.45, p < .0001$ ; and acculturation stress,  $F(1, 273) = 5.46, p < .02$ . However, regression revealed that only other drug dependence was retained in the final model ( $t = 2.82, p < .005$ ). There were no significant associations with wake-up time and any of the diagnostic variables or gender. However, wake-up time was associated with being currently employed,  $F(1, 273) = 5.60, p < .02$ . The number of hours slept during the night was significantly associated with being currently employed,  $F(1, 288) = 6.87, p < .009$ , and with major depressive disorder,  $F(1, 289) = 14.54, p < .0001$ , and both remained significant in the forward stepwise regression (depression:  $t = -3.91, p < .0001$ ; currently employed:  $t = -2.26, p < .024$ ). Experiencing awakenings in the early morning or the middle of the night was significantly associated with anxiety disorders,  $F(1, 282) = 5.85, p < .023$ , and major depressive disorder,  $F(1, 292) = 5.65, p < .018$ . Both remained significant in the regression analyses (anxiety:  $t = 2.19, p < .029$ ; depression:  $t = 2.27, p < .024$ ).

### Discussion

The present study did not find that this sample of young-adult, mostly second-generation Mexican Americans suffered from poor quality sleep, overall. However, within this population, lifetime diagnoses of alcohol-use disorders, family history of alcohol dependence, acculturation stress, and lifetime diagnoses of major depressive disorder were all correlated with significantly poorer quality sleep as indexed by the global score on the PSQI. An important finding in first generation (i.e., immigrant generation) Mexican Americans is that alcohol use and other psychiatric disorders increase in frequency with time spent in the United States (Blume et al., 2009; Breslau et al., 2009; Burnam et al., 1987; Cherpitel et al., 2007; Golding and Burnam, 1990; Grant et al., 2004b; Kessler et al., 1994; Strunin et al., 2007; Vega et al., 1998, 2003). The increase in alcohol-use disorders and other psychiatric disorders seen in Mexican Americans that is associated with time spent living in the United States may not be related to changes in cultural identification per se, but may also be the result of the “stress” of acculturation. In the present community-based study of Mexican American young adults, lifetime diagnoses of alcohol dependence, substance dependence, and anxiety disorders were associated with elevations in acculturation stress (Ehlers et al., 2009). Sleep may be an important variable that could potentially

mediate the relationship between acculturation stress and substance use and other psychiatric disorders. Only one study has evaluated the relationship between acculturation and sleep. In that study, U.S.-born Mexican Americans were more likely to be short sleepers than Mexican immigrants (Hale and Rivero-Fuentes, 2009); in addition, “stress” and smoking appeared to account for the increased incidence of short sleepers. However, whether the “stress” participants in the survey endorsed was related to acculturation and whether other substance use or other co-morbid psychiatric disorders were associated with sleep duration was not explored. Additionally, no other measures of sleep quality or quantity were evaluated. Our study also found an association between depressive disorders and poorer sleep as indexed by the PSQI. These data are consistent with another study of recent Hispanic-American immigrants in which disturbance in sleep quality as indexed by the PSQI appeared to mediate the relationship between “perceived racism” and depressive symptoms (Steffen and Bowden, 2006).

Family history of alcohol dependence was also found to be associated with global score on the PSQI in the present study. There are several studies that have found that children with a parental history of alcohol-use disorders may have signs of disturbed sleep (Dahl et al., 2003; Tarokh and Carskadon, 2010). Whereas, other studies have demonstrated that sleep problems at ages 3-8 predicted onset of alcohol use (Wong et al., 2009). Thus it appears that etiological relationships between alcohol-use disorders, acculturation stress, and sleep may not be easily disentangled. Similar problems have been found in the relationship between sleep and depression, where the bidirectional associations between sleep disturbance and depression create difficulty in differentiating cause-and-effect relationships (see Franzen and Buysse, 2008). However, this study did find that anxiety and depression were more likely to increase certain symptoms of sleep, such as number of hours slept and waking up in the middle of the night/early morning, whereas drug-use disorders were more likely to affect the time it took to fall asleep. These data preliminarily suggest that anxiety and depression may affect mechanisms regulating the second half of the night, such as circadian factors, whereas substance-use disorders may affect mechanisms regulating the first half of the night, such as homeostatic factors. These findings find partial support from studies demonstrating that alcohol dependence is more likely to be associated with deficits in slow wave sleep, especially during the first half of the night (Irwin et al., 2000, 2002).

It is important to consider some of the present study’s limitations. The study did not analyze a random sample of Hispanics living in San Diego County, but rather, it focused on Mexican American young adults legally residing in the United States who responded to a flyer to participate in research. Therefore, the findings may not generalize to all Mexican Americans or all Hispanic young-adult Americans.

More than half the participants in the present study were women, and thus, findings may not generalize to previous studies that have focused on samples of mostly male participants. Second, the study was limited to young adults between the ages of 18 and 30 years and those who spoke English. This allowed the use of validated instruments and an investigation of the association between the PSQI, substance-use disorders, and acculturation stress. However, because not all of the participants in the study had passed through the age of risk for these disorders, the strength of this association with alcohol-use disorders may be limited. Evaluation of sleep did not include polysomnography, evaluation of sleep-disordered breathing, or urine toxicology screens. Further studies employing a longitudinal design will be required to test the relationship of the PSQI, acculturation stress, and eventual alcohol-related morbidity and mortality. Despite these limitations, this report represents an important first step in an ongoing investigation to determine risk and protective factors associated with the development of substance-use disorders in Mexican Americans.

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### References

- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.
- Ancoli-Israel, S., & Roth, T. (1999). Characteristics of insomnia in the United States: Results of the 1991 National Sleep Foundation Survey. *I. Sleep*, *22* (Suppl. 2), S347-S353.
- Blume, A. W., Resor, M. R., Villanueva, M. R., & Braddy, L. D. (2009). Alcohol use and comorbid anxiety, traumatic stress, and hopelessness among Hispanics. *Addictive Behaviors*, *34*, 709-713.
- Breslau, J., Borges, G., Hagar, Y., Tancredi, D., & Gilman, S. (2009). Immigration to the USA and risk for mood and anxiety disorders: Variation by origin and age at immigration. *Psychological Medicine*, *39*, 1117-1127.
- Brower, K. J. (2001). Alcohol's effects on sleep in alcoholics. *Alcohol Research and Health*, *25*, 110-125.
- Brower, K. J., Aldrich, M. S., & Hall, J. M. (1998). Polysomnographic and subjective sleep predictors of alcoholic relapse. *Alcoholism: Clinical and Experimental Research*, *22*, 1864-1871.
- Brower, K. J., Aldrich, M. S., Robinson, E. A., Zucker, R. A., & Greden, J. F. (2001). Insomnia, self-medication, and relapse to alcoholism. *American Journal of Psychiatry*, *158*, 399-404.
- Bucholz, K. K., Cadoret, R., Cloninger, C. R., Dinwiddie, S. H., Hesselbrock, V. M., Nurnberger, J. I., Jr., . . . Schuckit, M. A. (1994). A new, semi-structured psychiatric interview for use in genetic linkage studies: a report on the reliability of the SSAGA. *Journal of Studies on Alcohol*, *55*, 149-158.
- Burnam, M. A., Hough, R. L., Karno, M., Escobar, J. I., & Telles, C. A. (1987). Acculturation and lifetime prevalence of psychiatric disorders among Mexican Americans in Los Angeles. *Journal of Health and Social Behavior*, *28*, 89-102.
- Buysse, D. J., Reynolds, C. F., 3rd., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*, *28*, 193-213.
- Caetano, R. (1984). A note on arrest statistics for alcohol-related offenses. *Drinking and Drug Practices Surveyor*, *19*, 12-17.
- Caetano, R., Clark, C. L., & Greenfield, T. K. (1998). Prevalence, trends, and incidence of alcohol withdrawal symptoms: Analysis of general population and clinical samples. *Alcohol Health and Research World*, *22*, 73-79.
- Caetano, R., & Kaskutas, L. A. (1995). Changes in drinking patterns among whites, blacks and Hispanics, 1984-1992. *Journal of Studies on Alcohol*, *56*, 558-565.
- Caetano, R., Vaeth, P. A., Ramisetty-Mikler, S., & Rodriguez, L. A. (2009). The Hispanic Americans Baseline Alcohol Survey (HABLAS): Alcohol beverage preference across Hispanic national groups. *Alcoholism: Clinical and Experimental Research*, *33*, 150-159.
- Carpenter, J. S., & Andrykowski, M. A. (1998). Psychometric evaluation of the Pittsburgh Sleep Quality Index. *Journal of Psychosomatic Research*, *45* (1 Spec. No.), 5-13.
- Cherpitel, C. J., Robertson, M., Ye, Y., Borges, G., Bautista, C. F., Lown, A., . . . Bond, J. (2007). Comorbidity for alcohol use disorders and drug use in Mexican-origin groups: Comparison of data from national alcohol surveys in the U.S. and Mexico. *Substance Use and Misuse*, *42*, 1685-1703.
- Clark, C. P., Gillin, J. C., Golshan, S., Demodena, A., Smith, T. L., Danowski, S., . . . Schuckit, M. (1998). Increased REM sleep density at admission predicts relapse by three months in primary alcoholics with a lifetime diagnosis of secondary depression. *Biological Psychiatry*, *43*, 601-607.
- Clark, C. P., Gillin, J. C., Golshan, S., Demodena, A., Smith, T. L., Danowski, S., . . . Schuckit, M. (1999). Polysomnography and depressive symptoms in primary alcoholics with and without a lifetime diagnosis of secondary depression and in patients with primary major depression. *Journal of Affective Disorders*, *52*, 177-185.
- Crum, R. M., Ford, D. E., Storr, C. L., & Chan, Y. F. (2004a). Association of sleep disturbance with chronicity and remission of alcohol dependence: Data from a population-based prospective study. *Alcoholism: Clinical and Experimental Research*, *28*, 1533-1540.
- Crum, R. M., Storr, C. L., Chan, Y. F., & Ford, D. E. (2004b). Sleep disturbance and risk for alcohol-related problems. *American Journal of Psychiatry*, *161*, 1197-1203.
- Dahl, R. E., Williamson, D. E., Bertocci, M. A., Stolz, M. V., Ryan, N. D., & Ehlers, C. L. (2003). Spectral analyses of sleep EEG in depressed offspring of fathers with or without a positive history of alcohol abuse or dependence: A pilot study. *Alcohol*, *30*, 193-200.
- Dawson, D. A. (1998). Beyond black, white and Hispanic: Race, ethnic origin and drinking patterns in the United States. *Journal of Substance Abuse*, *10*, 321-339.
- Drummond, S. P., Gillin, J. C., Smith, T. L., & Demodena, A. (1998). The sleep of abstinent pure primary alcoholic patients: Natural course and relationship to relapse. *Alcoholism: Clinical and Experimental Research*, *22*, 1796-1802.
- Ehlers, C. L., Gilder, D. A., Criado, J. R., & Caetano, R. (2009). Acculturation stress, anxiety disorders, and alcohol dependence in a select population of young adult Mexican Americans. *Journal of Addiction Medicine*, *3*, 227-233.
- Foster, J. H., & Peters, T. J. (1999). Impaired sleep in alcohol misusers and dependent alcoholics and the impact upon outcome. *Alcoholism: Clinical and Experimental Research*, *23*, 1044-1051.
- Franzen, P. L., & Buysse, D. J. (2008). Sleep disturbances and depression: Risk relationships for subsequent depression and therapeutic implications. *Dialogues in Clinical Neuroscience*, *10*, 473-481.
- Gilder, D. A., Lau, P., Gross, A., & Ehlers, C. L. (2007). Co-morbidity of

- alcohol dependence with other psychiatric disorders in young adult Mexican Americans. *Journal of Addictive Diseases*, 26, 31-40.
- Gillin, J. C., Smith, T. L., Irwin, M., Butters, N., Demodena, A., & Schuckit, M. (1994). Increased pressure for rapid eye movement sleep at time of hospital admission predicts relapse in nondepressed patients with primary alcoholism at 3-month follow-up. *Archives of General Psychiatry*, 51, 189-197.
- Golding, J. M., & Burnam, M. A. (1990). Immigration, stress, and depressive symptoms in a Mexican-American community. *Journal of Nervous and Mental Disease*, 178, 161-171.
- Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S. P., Dufour, M. C., & Pickering, R. P. (2004a). The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug and Alcohol Dependence*, 74, 223-234.
- Grant, B. F., Stinson, F. S., Hasin, D. S., Dawson, D. A., Chou, S. P., & Anderson, K. (2004b). Immigration and lifetime prevalence of DSM-IV psychiatric disorders among Mexican Americans and non-Hispanic whites in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, 61, 1226-1233.
- Hale, L., & Do, D. P. (2007). Racial differences in self-reports of sleep duration in a population-based study. *Sleep*, 30, 1096-1103.
- Hale, L., & Rivero-Fuentes, E. (2009). Negative acculturation in sleep duration among Mexican Immigrants and Mexican Americans. *Journal of Immigrant and Minority Health* (Online first). Retrieved from <http://www.springerlink.com/content/119982>
- Hasin, D. S., Stinson, F. S., Ogburn, E., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, 64, 830-842.
- Helzer, J. E., Burnam, A., & McEvoy, L. T. (1991). Alcohol abuse and dependence. In L. N. Robins & D. A. Regier (Eds.), *Psychiatric disorders in America: The epidemiologic catchment area study* (pp. 81-115). New York: The Free Press.
- Hesselbrock, M., Easton, C., Bucholz, K. K., Schuckit, M., & Hesselbrock, V. (1999). A validity study of the SSAGA—a comparison with the SCAN. *Addiction*, 94, 1361-1370.
- Irwin, M., Gillin, J. C., Dang, J., Weissman, J., Phillips, E., & Ehlers, C. L. (2002). Sleep deprivation as a probe of homeostatic sleep regulation in primary alcoholics. *Biological Psychiatry*, 51, 632-641.
- Irwin, M., Miller, C., Gillin, J. C., Demodena, A., & Ehlers, C. L. (2000). Polysomnographic and spectral sleep EEG in primary alcoholics: An interaction between alcohol dependence and African-American ethnicity. *Alcoholism: Clinical and Experimental Research*, 24, 1376-1384.
- Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., Wittchen, H. U., & Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry*, 51, 8-19.
- Kripke, D. F., Jean-Louis, G., Elliott, J. A., Klauber, M. R., Rex, K. M., Tuunainen, A., Langer, R. D. (2004). Ethnicity, sleep, mood, and illumination in postmenopausal women. *BMC Psychiatry*, 4, 8.
- Lara, M., Gamboa, C., Kahramanian, M. I., Morales, L. S., & Bautista, D. E. (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health*, 26, 367-397.
- Mena, F. J., Padilla, A. M., & Maldonado, M. (1987). Acculturative stress and specific coping strategies among immigrant and later generation college students. *Hispanic Journal of Behavioral Science*, 9, 207-225.
- Nielsen, A. L. (2000). Examining drinking patterns and problems among Hispanic groups: Results from a national survey. *Journal of Studies on Alcohol*, 61, 301-310.
- Ram, S., Seirawan, H., Kumar, S. K., & Clark, G. T. (2010). Prevalence and impact of sleep disorders and sleep habits in the United States. *Sleep and Breathing*, 14, 63-70.
- Reardon, S. F., & Buka, S. L. (2002). Differences in onset and persistence of substance abuse and dependence among whites, blacks, and Hispanics. *Public Health Reports*, 117 (Suppl. 1), S51-S59.
- Roberts, R. E., Roberts, C. R., & Chan, W. (2006). Ethnic differences in symptoms of insomnia among adolescents. *Sleep*, 29, 359-365.
- Roberts, R. E., Roberts, C. R., & Chen, I. G. (2000). Ethnocultural differences in sleep complaints among adolescents. *Journal of Nervous and Mental Disease*, 188, 222-229.
- Steffen, P. R., & Bowden, M. (2006). Sleep disturbance mediates the relationship between perceived racism and depressive symptoms. *Ethnicity and Disease*, 16, 16-21.
- Stinson, F. S., Yi, H., Grant, B. F., Chou, P., Dawson, D. A., & Pickering, R. (1998). *Drinking in the United States: Main findings from the 1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES)*. U.S. Alcohol Epidemiologic Data Reference Manual (Vol. 6, 1st ed., NIH Publication No. 99-3519). Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism. Retrieved from <http://pubs.niaaa.nih.gov/publications/Nlaesdrm.pdf>
- Strunin, L., Edwards, E. M., Godette, D. C., & Heeren, T. (2007). Country of origin, age of drinking onset, and drinking patterns among Mexican American young adults. *Drug and Alcohol Dependence*, 91, 134-140.
- Tarokh, L., & Carskadon, M. A. (2010). Sleep electroencephalogram in children with a parental history of alcohol abuse/dependence. *Journal of Sleep Research*, 19, 165-174.
- Vaeth, P. A., Caetano, R., Ramisetty-Mikler, S., & Rodriguez, L. A. (2009). Hispanic Americans Baseline Alcohol Survey (HABLAS): Alcohol-related problems across Hispanic national groups. *Journal of Studies on Alcohol and Drugs*, 70, 991-999.
- Vega, W. A., Gil, A. G., Warheit, G. J., Zimmerman, R. S., & Apospori, E. (1993). Acculturation and delinquent behavior among Cuban American adolescents: Toward an empirical model. *American Journal of Community Psychology*, 21, 113-125.
- Vega, W. A., Kolody, B., Aguilar-Gaxiola, S., Alderete, E., Catalano, R., & Caraveo-Anduaga, J. (1998). Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. *Archives of General Psychiatry*, 55, 771-778.
- Vega, W. A., Sribney, W. M., & Achara-Abrahams, I. (2003). Co-occurring alcohol, drug, and other psychiatric disorders among Mexican-origin people in the United States. *American Journal of Public Health*, 93, 1057-1064.
- Wong, M. M., Brower, K. J., Fitzgerald, H. E., & Zucker, R. A. (2004). Sleep problems in early childhood and early onset of alcohol and other drug use in adolescence. *Alcoholism: Clinical and Experimental Research*, 28, 578-587.
- Wong, M. M., Brower, K. J., & Zucker, R. A. (2009). Childhood sleep problems, early onset of substance use and behavioral problems in adolescence. *Sleep Medicine*, 10, 787-796.