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Gender Differences in Acculturative Stress and Habitual Sleep Duration in Korean American Immigrants

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Abstract

Background: Korean American immigrants (KAIs) face diverse sociocultural stressors in the acculturation process. While stress is known to cause short sleep, little is known about how acculturative stress affects sleep differently for KAI men and women. The purpose of this cross-sectional study was to examine gender differences in the association between diverse domains of acculturative stress and sleep duration among KAIs.

Methods: Middle-aged KAIs were recruited in community settings and online. KAIs completed validated measures of acculturative stress (homesickness, social isolation, employment barriers, discrimination, civic disengagement, and family problems) and sleep duration. Multiple linear regression analysis was performed and stratified by gender.

Results: 343 KAIs participated (mean age = 41±10 years, 47% female, 11% short sleepers [<6 hours]). After adjustment for covariates, higher homesickness ($\beta = -23.19$, $p < 0.05$) and lower civic disengagement ($\beta = 17.75$, $p < 0.05$) were associated with shorter sleep duration in women, while higher isolation was associated with shorter sleep duration in men ($\beta = -13.73$, $p < 0.05$).

Discussion: Results suggest gender-specific associations between acculturative stress and sleep duration. Future research should take into account gender differences in the experience and effects of acculturative stress when developing interventions to improve sleep health in KAIs.

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Compliance with Ethical Standards

Conflict of Interest

Chorong Park, Tanya M. Spruill, Mark J. Butler, Simona C. Kwon, Nancy S. Redeker, Rida Gharzeddine, Robin Whittemore declare that they have no conflict of interest.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

Keywords

sleep duration; acculturative stress; gender differences; Korean American immigrants

Introduction

Short sleep duration is associated with increased risk of hypertension, cardiovascular disease and mortality in recent epidemiological studies [1, 2]. In particular, according to a meta-analysis of sleep duration and mortality, short sleep duration was more strongly associated with mortality in East Asians than in European or U.S. populations [3]. Moreover, Asian Americans are more likely to report short sleep duration (< 7 hours) than Whites (33% vs. 28%, $p < 0.001$) in the U.S. [4]. For example, Chinese Americans demonstrated an average of 6.35 hours of Actigraphy-measured sleep duration per night, which was shorter than Whites (6.85 hours) and Hispanics (6.56 hours) in a large population study [5]. Korean American immigrants (KAIs), about 1.8 million people, represent the fifth largest Asian subgroup and one of the fastest growing ethnic minorities in the U.S. [6]. Despite research findings on sleep duration among Asian Americans, there is a paucity of research specific to KAIs sleep duration and related factors. There is only one study describing KAIs sleep duration with 52 KAI older adults recruited using community-based convenience sampling. The study demonstrated that the average sleep duration was 4.8 hours/day [7]. This duration was lower than the U.S. general population aged over 65 (6.4–6.75 hours/day) [7, 8].

Stress is one factor known to be related to sleep [9]. Physiologically, stress stimulates excessive activity of the hypothalamo-pituitary-adrenal axis and increases cortisol levels [10]. The increased cortisol is associated with high frequency EEG activity to maintain wakefulness which cause sleep disturbance and short sleep duration [10, 11]. Psychologically, stress is linked to emotional distress (i.e., depression, anger, anxiety, worry) which activates rumination processes and impedes falling and staying asleep [12]. Indeed, several studies demonstrated that chronic stress was significantly related to shorter sleep duration and poor sleep quality in diverse women including Chinese immigrants [9] and in a large population sample of African Americans [13].

Immigrant populations may be more prone to stress as they face challenges related to navigating their new home country, systems, policies, and languages. This particular type of stress which results from the process of acculturation, is referred to as acculturative stress [14]. In a large probability sample of adults including White, Black, US-born and foreign-born Hispanics, acculturative stress including everyday racial discrimination and major experiences of racial discrimination were associated with shorter sleep duration, adjusted for other socio-economical correlates and race/ethnicity. Even after controlling for other psychosocial stressors, everyday racial discrimination was significantly associated with shorter sleep duration [15]. In addition, in a cross-sectional study with Latino immigrants, ethnic discrimination was positively associated with the prevalence of short sleep duration (RRR=1.16, 95% CI = 1.02, 1.31), compared to recommended sleep duration [16]. KAIs frequently report acculturative stress including discrimination, financial hardships, homesickness, and other emotional arousals caused by immigration challenges [17]. Thus,

acculturative stress may also be associated with shorter sleep duration in KAIs; however, there is no study investigating the relationship between acculturative stress and sleep duration in KAIs.

Along with immigration status, research findings indicate gender differences in the appraisal of psychological and physiological responses to stress, which can negatively influence sleep duration. Women report higher levels of general stress [18] and more negative impact of stress than men, including psychological distress, somatic symptoms, and sleep disturbance [19]. Additionally, in a diverse sample of men and women in the US, women were more likely than men to report short sleep duration [20] and poor subjective sleep quality, including a higher prevalence of insomnia [21].

KAI women and men experience acculturation differently and perceive stress from different sources. Korean culture is based on Confucianism, which emphasizes a strong commitment to filial responsibility and caregiving in women [22]. Therefore, KAI women often struggle with the conflict between preserving Korean cultural values and adapting to a new socio-cultural environment and they feel more barriers than men when entering Western society [22]. Previous studies characterized KAI women's acculturation experience as having lower levels of acculturation toward American culture, and lower reported English proficiency [23]. KAI men typically experience economic and social loss after immigration because their skills and occupational experiences from Korea may not equivalently transfer to new jobs in the U.S [24]. Traditional social and gender norms guide social expectations that KAI men are the family breadwinners and that their success and authority is determined by their economic competence. Thus, KAI men's downgraded occupational position and financial instability can result in high stress [25].

Despite the different appraisal of acculturative stress by gender among KAIs, there is no study examining these gender differences in the relationship between diverse domains of acculturative stress and sleep duration among KAIs. It is important to understand how acculturation affects sleep differently for men and women as gender-specific intervention efforts may be needed to improve sleep in this population and ultimately to reduce cardiovascular disease risk and mortality in KAIs. Therefore, the purpose of this study is to examine gender differences in the associations between multiple domains of acculturative stress and sleep duration in KAIs.

Methods

Study Design

This cross-sectional study was approved by the Yale University Institutional Review Board and all participants provided written informed consent.

Sample and Setting

The sample included individuals who were: (1) between 30 and 65 years old; (2) self-identified as KAIs living in the U.S.; and (3) able to read, speak and write either in Korean or English. We targeted middle-aged KAIs due to their high prevalence of cardio-metabolic

diseases [26]. We excluded pregnant women because pregnancy may change sleep duration [27].

To obtain a representative sample of KAIs living in diverse U.S. regions, we used online and in-person recruitment strategies. Data collection occurred between September 2015 and January 2016. We posted study advertisements and a Qualtrics survey link on the dashboards of two U.S. based online KAI communities. For in-person recruitment, we obtained approvals from four Korean American churches and one Korean American community center located in urban areas in Pennsylvania and New York. The principal investigator introduced the study at the Sunday services of the churches, provided printed survey questionnaires and collected the completed forms at the following Sunday service or via pre-paid mailing. Survey questionnaires were available in both Korean and English from previous studies. Only two questionnaires, the Charlson Comorbidity Index [28] and the Sleep Environment Subscale of the Sleep Hygiene Practice Scale [29], were not available in Korean. These questionnaires were translated into Korean by our research team through established procedures, consisting of translation, back-translation, expert review, and calculation of the translation validity index [30]. The questionnaires demonstrated excellent translation validity in our study. A total of A \$5.00 gift card was provided to participants upon completion of the survey.

Variables and Measures

Sleep duration.—Sleep duration during the past month was assessed with one item which is a widely used self-report measure of sleep duration: “During the past month, how many hours of actual sleep did you get at night?” Weekdays and weekends were answered separately and were weighted (5/7 and 2/7) to yield average habitual sleep duration [31].

Acculturative stress.—The Acculturative Stress Index, developed by Noh and Avison [32] and modified by Moon [33], was used to assess multiple stressors associated with the acculturation process. The original Acculturative Stress Index included 31 items coded on a 4-point Likert scale (“never” to “always”) with 7 subscales [32]. In a subsequent psychometric analysis, the measure was refined to include 17 items with 6 subscales; homesickness, social isolation, employment barrier, discrimination, civic disengagement, and family problems [33]. Homesickness is defined by emotional arousal in response to separation from one’s home country and attachments. Social isolation is defined by a lack of close friends. Employment barrier is defined by under- or unemployment due to lack of recognition of foreign credentials. Discrimination is defined by experiences of discrimination and alienation. Civic disengagement is defined by a lack of engagement in political activities. Family problem is defined by various problems or concerns related to one’s family. A higher mean score on each subscale represents a higher level of each type of acculturative stress. All subscales demonstrated acceptable reliability (Cronbach’s α range = 0.75 – 0.90) [33] and in this study, the Cronbach’s α coefficients ranged from 0.77 to 0.90.

Acculturation-related variables.—Acculturation-related variables included age immigrated to the U.S., English language proficiency (speaking, reading, and writing on a 4-point scale (0 = not at all, 3 = very well)) [34], living in a Korean American dominant

neighborhood (yes/no), and Korean and American orientations as assessed by the Vancouver Index of Acculturation [35]. This instrument includes 10 items for Korean orientation (Cronbach's $\alpha = 0.79$) and 10 items for American orientation (Cronbach's $\alpha = 0.75$), each on a 9-point Likert scale (1 = strongly disagree, 9 = strongly agree) [35]. Higher scores on the Korean (or American) subscale represents higher levels of adherence to Korean (or American) traditions and values. In this study, the scale demonstrated good reliability with Cronbach's α of 0.81 (Korean orientation) and 0.87 (American orientation).

Covariates.—Covariates included socio-demographic and clinical characteristics, and sleep environment. Socio-demographic characteristics included age, gender, household income (less than or more than \$40,000), employment (full-time work yes/no), marital/partner status (yes/no). Clinical characteristics were assessed using the Comorbidity Questionnaire [28]. This questionnaire assesses 12 medical conditions including depression. A higher total score indicates greater comorbidity. This questionnaire had acceptable convergent validity with the chart-based Charlson Comorbidity Index (Spearman's $\rho = 0.55$) and excellent test-retest reliability (Intraclass Correlation Coefficient [ICC] = 0.94) [28]. Sleep environment was measured by the Sleep Environment Subscale of the Sleep Hygiene Practice Scale [29]. This measure consists of 8 items assessing bedroom noisiness, brightness, humidity, temperature, ventilation, bedding, presence of sleep-unrelated items (e.g., TV), and the presence of a sleep partner. Each item was coded from 1 (always) to 6 (never), and a higher total score indicated a better sleep environment. The discriminant validity (good sleepers vs insomniacs) of the instrument is acceptable ($p = 0.06$) [29]. In this study, the scale demonstrated excellent reliability (Cronbach's $\alpha = 0.83$).

Statistical Methods

We calculated descriptive statistics for each variable and compared participant characteristics by gender. Independent samples t tests, Pearson's product-moment correlations, and Spearman correlations were used as appropriate to assess bivariate associations between independent variables and sleep duration. We found no indication of multicollinearity among acculturative stress subscales using variance inflation factor ($VIF < 3$), so the subscales were examined in the same model. However, there was significant multicollinearity between age and length of U.S. residency ($VIF = 46.7$). Since age is a well-known predictor of short sleep duration [1] and length of U.S. residency is not an indicator of acculturation in KAIs [36], we excluded length of U.S. residency from the analysis.

The primary outcome for this analysis was average daily minutes of sleep duration. All analyses were stratified by gender. Three nested regression models were estimated to test the association between acculturative stress and sleep duration. Model 1 contained the six subscales of acculturative stress simultaneously. Model 2 added socio-demographic characteristics (age, marital status, income, employment status), comorbidity, and sleep environment. Model 3 added acculturation-related variables (English proficiency, residency in Korean American dominant neighborhood, Korean orientation, American orientation,) to test whether the relationships between acculturative stress subscales and sleep duration are independent of other acculturation-related variables.

We conducted a sensitivity analysis to examine short (< 6 hours) sleep duration versus other sleep duration (≥ 6 hours) [37] in relation to acculturative stress subscales since treating sleep duration as a continuous variable may obscure relationships found at both ends of the continuum. Due to the small number of participants with long sleep (≥ 9 hours; n = 12) in our sample, we were not able to examine predictors of long sleep duration. We used logistic regression models with the same covariates and model sequence that was used to examine continuous sleep duration. Statistical significance was set at an α level of .05 based on the two-tailed test. SPSS was used for statistical analysis (SPSS, Version 22).

Results

Characteristics of Samples

Descriptive statistics for all variables are presented in Table 1. A total of 343 KAIs were enrolled and their mean age was 41 years (SD = 10) and 47% were women. About 80% of participants completed the survey in Korean. There was no participant who was diagnosed or treated with depression or other mental health issues by self-report. The most frequent comorbidity was hypertension (9.1%) followed by diabetes (5.2%). Men and women had similar sociodemographic characteristics with the exception that men were younger and more likely to be employed full-time compared to women (68% versus 41%; $p < 0.001$). Women were significantly less proficient in English than men (5.4 versus 5.9 respectively; $p = 0.003$) and reported higher levels of acculturative stress than men for five of six subscales: homesickness, social isolation, employment barrier, discrimination, and civic disengagement. On average, study subjects slept 428 minutes, or 7 hours 8 minutes (SD = 61 minutes) per night and 31 participants (11%) were classified as short sleepers (< 6 hours). Women had higher prevalence of short sleep (14%) than men (8%), but this difference was not statistically significant ($p = 0.11$).

Sleep duration was negatively related to English proficiency, living in a Korean American-dominant neighborhood, greater homesickness, greater isolation, and greater discrimination (Table 2) among women. In men, shorter sleep duration was significantly associated with greater isolation only (Table 3). Across both genders, acculturation-related variables were correlated with some of the acculturative stress subscales but these associations varied by gender.

Associations between Acculturative Stress Subscales and Sleep Duration

We next utilized multivariate regressions to examine the associations between all 6 components of acculturative stress and sleep duration separately in KAI women and men. Among women, none of the acculturative stress subscales were significantly associated with sleep duration in the unadjusted model (Table 4; Model 1). After adjustment for sociodemographic characteristics, comorbidity and the sleep environment (Table 4; Model 2), homesickness was negatively associated with sleep duration [β (SE) = $-22.37(9.27)$; $p = 0.02$] and civic disengagement was positively associated with sleep duration [β (SE) = $18.96(7.53)$; $p = 0.01$]. After final adjustment for acculturation-related variables (Table 4; Model 3), homesickness [β (SE) = $-23.19(9.19)$, $p = 0.02$] and civic disengagement [β (SE) = $17.75(7.76)$, $p = 0.02$] remained significantly associated with sleep duration.

Among men, isolation was significantly negatively associated with sleep duration in the unadjusted model (Table 4; Model 1). After adjustment for sociodemographic characteristics, comorbidity and the sleep environment (Table 4; Model 2), isolation remained significantly associated with sleep duration [β (SE) = -13.87(5.78); $p = 0.02$]. After final adjustment for acculturation-related variables (Table 4; Model 3), isolation remained statistically significant [β (SE) = -13.73(5.89); $p = 0.02$].

Sensitivity Analysis

Multivariate logistic regressions examining the association between acculturative stress and short sleep showed the same pattern of results reported above, and all findings remained statistically significant in both men and women (Table 5). In addition, the positive association between discrimination and short sleep (< 6 hours versus ≥ 6 hours) was statistically significant in the fully adjusted model in KAI women.

Discussion

Our results provide evidence of the negative relationships between acculturative stress and sleep duration in KAIs. Although KAI women and men did not significantly differ in terms of their habitual sleep duration or prevalence of short sleep, KAI women reported higher levels of acculturative stress than men across multiple domains including homesickness, social isolation, employment barrier, discrimination, and civic disengagement. Associations among various aspects of acculturative stress and sleep duration among KAIs differed by gender. Among KAI women, higher homesickness and lower civic disengagement were related to shorter sleep duration. Among KAI men, only isolation was related to shorter sleep duration.

To our knowledge, there is no study investigating the relationships between acculturative stress and sleep duration in Asian immigrants. Only one study examined the relationship between acculturative stress and sleep duration with Hispanic immigrants; in the study, acculturative stress was significantly related to higher odds of insomnia but not significantly related to shorter sleep duration [16]. In addition, no gender differences were identified in the association of acculturative stress with sleep [16]. Our findings indicating the negative association of acculturative stress with sleep duration, adds to the knowledge base and provides initial evidence that acculturative stress effects may differ between KAIs and Hispanic immigrants. Also, our findings suggest that acculturative stress may have an adverse impact on sleep among KAIs independent of their socio-economic status, sleep environment, and acculturation characteristics. Future research is necessary to confirm our findings with specifically measured acculturative stressors which are conceptually and physiologically linked to sleep in a large KAI population, and other immigrant populations.

Although we do not know the underlying mechanisms of the observed gender differences in the association of acculturative stress and sleep duration, the finding that homesickness was associated with shorter sleep duration for KAI women but not for men is aligned with previous studies. In a study of U.S. university students, female students perceived stronger homesickness compared to male students [38], which in turn had indirect effects on sleep difficulties via psychological distress including depressive symptoms and anxiety [38].

Psychological distress is well known risk factors for sleep disturbance including short or long sleep duration [39]. Further study is necessary to evaluate the relationship among homesickness, psychological distress, and sleep duration in KAIs.

Our findings also indicate that engaging in U.S. politics was associated with shorter sleep duration for KAI women. Findings from national survey data of registered Asian American voters indicate that Korean Americans report the lowest voting participation rate (46%) of all race/ethnicity groups, even after taking into account their low rate of citizenship [40]. In particular, Korean American women were less likely than men to participate in voting and women born in Korea were less likely than women born in the U.S. to vote [41]. Despite low voting participation, KAI women may be motivated for civic engagement to address their unique challenges. It may be that the KAI women who are involved in civic engagement are more stressed about their immigration status or living conditions which motivates them to be involved. Several studies exploring the process of political engagement demonstrated that the strongest motivation for political engagement is anger [42, 43] and especially for immigrants, the strongest motivation is an immigration-related policy directly related to their immigration status [44]. KAI women who are actively engaged in U.S. politics may be deeply concerned about legal problems or highly motivated by anger, which may in turn lead to shorter sleep duration.

Interestingly, we found that social isolation was associated with shorter sleep duration in KAI men but not women. In a large population-based study, social isolation was positively related to sleep disturbance including short sleep duration [45], but there is no study investigating the gender differences in the relationship between social isolation and sleep duration. However, a large population-based prospective study reported that although women reported greater feelings of social isolation than men, such feelings were associated with increased mortality only in men and not women [46]. This may be due in part because men are reluctant to disclose their distress from social isolation and may be more vulnerable to emotional distress from social isolation [46]. Similarly, KAI men may be more vulnerable to social isolation than KAI women, which may result in shorter sleep duration in KAI men.

There are several limitations in this study. First, our sample was based on convenience sampling. Future studies should examine these relationships in a larger, more representative sample of KAIs. An additional limitation was that all data were collected by self-report, including sleep duration. Several studies have demonstrated discordance between self-reported and objectively measured sleep duration [47]. Further studies with objective measurement of sleep duration should be conducted to confirm our findings. Third, we did not collect the information on presence of primary sleep disorders (i.e., insomnia, sleep apnea) or sleep continuity which may be inter-related with sleep duration as well as influenced by acculturative stress. Lastly, we did not ask menopausal status among women, which may influence sleep duration in KAI women.

Our results have clinical implications for sleep promotion interventions and tailoring such strategies for KAI men and women. Potential strategies include integration of screening by health professionals on acculturative stress levels to identify KAIs who may be experiencing challenges and stressors associated with acculturation. Findings also can inform the

development of gender-specific, culturally-tailored stress management interventions for KAI men and women to improve and promote sleep health. For example, for KAI men, strengthening their social and family networks may be beneficial to reducing their feelings of isolation and promote their sleep health. For women, training in active coping strategies to reduce homesickness may be helpful for promoting their emotional and sleep health.

Conclusions

In summary, findings from our study suggest gender-specific associations between diverse domains of acculturative stress and sleep duration. Specifically, homesickness and civic engagement were associated with short sleep duration among KAI women, while social isolation was associated with short sleep duration among KAI men. These findings can inform the development of stress management interventions that are tailored for the gender and cultural context for KAI men and women to improve and promote sleep health.

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Reference

1. Grandner M, Mullington JM, Hashmi SD, Redeker NS, Watson NF, Morgenthaler TI. Sleep duration and hypertension: Analysis of > 700,000 adults by age and sex. *J Clin Sleep Med*. 2018;14(6):1031–9. [PubMed: 29852916]
2. Grandner MA, Chakravorty S, Perlis ML, Oliver L, Gurubhagavatula I. Habitual sleep duration associated with self-reported and objectively determined cardiometabolic risk factors. *Sleep medicine*. 2014;15(1):42–50. [PubMed: 24333222]
3. Krittanawong C, Tunhasirwet A, Wang Z, Zhang H, Farrell AM, Chirapongsathorn S, Sun T, Kitai T, Argulian E. Association between short and long sleep durations and cardiovascular outcomes: A systematic review and meta-analysis. *Eur Heart J Acute Cardiovasc Care*. 2017;2048872617741733.
4. Jackson CL, Kawachi I, Redline S, Juon H-S, Hu FB. Asian-White disparities in short sleep duration by industry of employment and occupation in the US: A cross-sectional study. *BMC Public Health*. 2014;14(1):552. [PubMed: 24894508]
5. Chen X, Wang R, Zee P, Lutsey PL, Javaheri S, Alcántara C, Jackson CL, Williams MA, Redline S. Racial/ethnic differences in sleep disturbances: The Multi-Ethnic Study of Atherosclerosis (MESA). *Sleep*. 2015;38(6):877–88. [PubMed: 25409106]
6. U.S. Bureau of the Census. *The Asian Population: 2010*. Washington, DC: US Department of Commerce; 2012.
7. Sok SR. Sleep patterns and insomnia management in Korean-American older adult immigrants. *J Clin Nurs*. 2008;17(1):135–43. [PubMed: 17419793]
8. Patel SR, Blackwell T, Redline S, Ancoli-Israel S, Cauley JA, Hillier TA, Lewis CE, Orwoll ES, Stefanick ML, Taylor BC. The association between sleep duration and obesity in older adults. *Int J Obes*. 2008;32(12):1825–34.
9. Hall MH, Casement MD, Troxel WM, Matthews KA, Bromberger JT, Kravitz HM, Krafty RT, Buysse DJ. Chronic stress is prospectively associated with sleep in midlife women: the SWAN sleep study. *Sleep*. 2015;38(10):1645–54. [PubMed: 26039965]
10. Hirotsu C, Tufik S, Andersen ML. Interactions between sleep, stress, and metabolism: From physiological to pathological conditions. *Sleep Sci*. 2015;8(3):143–52. [PubMed: 26779321]

11. Van Reeth O, Weibel L, Spiegel K, Leproult R, Dugovic C, Maccari S. Physiology of sleep (review)–interactions between stress and sleep: from basic research to clinical situations. *Sleep Med Rev.* 2000;4(2):201–19.
12. Beatty DL, Hall MH, Kamarck TA, Buysse DJ, Owens JF, Reis SE, Mezick EJ, Strollo PJ, Matthews KA. Unfair treatment is associated with poor sleep in African American and Caucasian adults: Pittsburgh SleepSCORE project. *Health Psychology.* 2011;30(3):351–9. [PubMed: 21553979]
13. Johnson DA, Lisabeth L, Lewis TT, Sims M, Hickson DA, Samdarshi T, Taylor H, Roux AVD. The contribution of psychosocial stressors to sleep among African Americans in the Jackson Heart Study. *Sleep.* 2016;39(7):1411–9. [PubMed: 27166234]
14. Nicholson LM, Miller AM, Schwertz D, Sorokin O. Gender differences in acculturation, stress, and salivary cortisol response among former Soviet immigrants. *J Immigr Minor Health.* 2013;15(3):540–52. [PubMed: 23224773]
15. Slopen N, Williams DR. Discrimination, other psychosocial stressors, and self-reported sleep duration and difficulties. *Sleep.* 2014;37(1):147–56. [PubMed: 24381373]
16. Alcántara C, Patel SR, Carnethon M, Castañeda SF, Isasi CR, Davis S, Ramos AR, Arredondo E, Redline S, Zee PC. Stress and sleep: Results from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study. *SSM Popul Health.* 2017;3:713–21. [PubMed: 29104908]
17. Noh S, Moon M. Acculturative Stress among Koean Immigrants. *Korean Immigrants in Canada: Perspectives on Migration, Integration, and the Family.* Toronto: University of Toronto Press; 2012. p. 133–48.
18. Cohen S, Janicki-Deverts D. Who's Stressed? Distributions of psychological stress in the United States in probability samples from 1983, 2006, and 2009. *J Appl Soc Psychol.* 2012;42(6):1320–34.
19. Matud MP. Gender differences in stress and coping styles. *Pers Individ Dif.* 2004;37(7):1401–15.
20. Cappuccio FP, Stranges S, Kandala N-B, Miller MA, Taggart FM, Kumari M, Ferrie JE, Shipley MJ, Brunner EJ, Marmot MG. Gender-specific associations of short sleep duration with prevalent and incident hypertension. *Hypertension.* 2007;50(4):693–700. [PubMed: 17785629]
21. Hall MH, Matthews KA, Kravitz HM, Gold EB, Buysse DJ, Bromberger JT, Owens JF, Sowers M. Race and financial strain are independent correlates of sleep in midlife women: the SWAN sleep study. *Sleep.* 2009;32(1):73–82. [PubMed: 19189781]
22. Sohng S, Song K. *Korean children and families. Culturally Competent Practice with Immigrant and Refugee Children and Families.* New York, NY 10012: The Guilford Press; 2004. p. 81–99.
23. Oh Y, Koeske GF, Sales E. Acculturation, stress, and depressive symptoms among Korean immigrants in the United States. *J Soc Psychol.* 2002;142(4):511–26. [PubMed: 12153126]
24. Liu WM. Exploring the lives of Asian American men: Racial identity, male role norms, gender role conflict, and prejudicial attitudes. *Psychol Men Masc.* 2002;3(2):107.
25. Kwon H-K, Rueter MA, Lee M-S, Koh S, Ok SW. Marital relationships following the Korean economic crisis: Applying the Family Stress Model. *J Marriage Fam.* 2003;65(2):316–25.
26. Shin C-N, Keller C, An K, Sim J. Cardiovascular disease in Korean Americans: A systematic review. *J Cardiovasc Nurs.* 2018;33(1):82–93. [PubMed: 28525522]
27. Reid KJ, Facco FL, Grobman WA, Parker CB, Herbas M, Hunter S, Silver RM, Basner RC, Saade GR, Pien GW. Sleep during pregnancy: The nuMoM2b pregnancy and sleep duration and continuity study. *Sleep.* 2017;40(5).
28. Sangha O, Stucki G, Liang MH, Fossel AH, Katz JN. The self-administered comorbidity questionnaire: A new method to assess comorbidity for clinical and health services research. *Arthritis Care Res.* 2003;49(2):156–63.
29. Yang, Lin SC, Hsu SC, Cheng CP. Maladaptive sleep hygiene practices in good sleepers and patients with insomnia. *J Health Psychol.* 2010;15(1):147–55. [PubMed: 20064894]
30. Tang ST, Dixon J. Instrument translation and evaluation of equivalence and psychometric properties: The Chinese Sense of Coherence Scale. *J Nurs Meas.* 2002;10(1):59–76. [PubMed: 12048971]
31. Lauderdale DS, Knutson KL, Yan LL, Liu K, Rathouz PJ. Self-reported and measured sleep duration: how similar are they? *Epidemiology.* 2008;19(6):838–45. [PubMed: 18854708]

32. Noh S, Avison WR. Asian immigrants and the stress process: A study of Koreans in Canada. *J Health Soc Behav.* 1996;192–206. [PubMed: 8690879]
33. Moon M Factor Structure and Psychometric Properties of the Acculturative Stress Index. Windsor, Ontario, Canada: University of Windsor; 2011.
34. Mui AC, Kang S-Y, Kang D, Domanski MD. English language proficiency and health-related quality of life among Chinese and Korean immigrant elders. *Health Soc work.* 2007;32(2):119–27. [PubMed: 17571645]
35. Ryder AG, Alden LE, Paulhus DL. Is acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *J Pers Soc Psychol.* 2000;79(1):49–65. [PubMed: 10909877]
36. Park C, Nam S, Whittemore R. Acculturation and lifestyle risk behaviors in Korean immigrants: Mediating effects of acculturative stress and body image discrepancy. *Circulation.* 2016;Suppl 1(134):A15099.
37. Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, Dinges DF, Gangwisch J, Grandner MA, Kushida C, Malhotra RK, Martin JL, Patel SR, Quan SF, Tasali E. Joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society on the recommended amount of sleep for a healthy adult: methodology and discussion. *Sleep.* 2015;38(8):1161–83. [PubMed: 26194576]
38. Biasi V, Mallia L, Russo P, Menozzi F, Cerutti R, Violani C. Homesickness experience, distress and sleep quality of first-year university students dealing with academic environment. *Journal of Educational and Social Research.* 2018;8(1):9–17.
39. Zhai L, Zhang H, Zhang D. Sleep duration and depression among adults: A meta-analysis of prospective studies. *Depress Anxiety.* 2015;32(9):664–70. [PubMed: 26047492]
40. Ramakrishnan Karthick. The Asian American Vote in 2016: Record Gains, but Also Gaps University of California Riverside: AAPI Data; 2017 [Available from: <http://aapidata.com/blog/voting-gains-gaps/>].
41. Phillips CD, Lee T. Superficial Equality: Gender and immigration in Asian American political participation. *Polit Groups Identities.* 2018;6(3):373–88.
42. Valentino NA, Brader T, Groenendyk EW, Gregorowicz K, Hutchings VL. Election night's alright for fighting: The role of emotions in political participation. *J Polit.* 2011;73(1):156–70.
43. Klandermans B, Van der Toorn J, Van Stekelenburg J. Embeddedness and identity: How immigrants turn grievances into action. *Am Sociol Rev.* 2008;73(6):992–1012.
44. Ballard PJ, Malin H, Porter TJ, Colby A, Damon W. Motivations for civic participation among diverse youth: More similarities than differences. *Res Hum Dev.* 2015;12(1–2):63–83.
45. Cho JH-J, Olmstead R, Choi H, Carrillo C, Seeman TE, Irwin MR. Associations of objective versus subjective social isolation with sleep disturbance, depression, and fatigue in community-dwelling older adults. *Aging Ment Health.* 2018:1–9.
46. Holwerda TJ, Beekman AT, Deeg DJ, Stek ML, van Tilburg TG, Visser PJ, Schmand B, Jonker C, Schoevers RA. Increased risk of mortality associated with social isolation in older men: only when feeling lonely? Results from the Amsterdam Study of the Elderly (AMSTEL). *Psychol Med.* 2012;42(4):843–53. [PubMed: 21896239]
47. Lauderdale DS, Knutson KL, Yan LL, Liu K, Rathouz PJ. Self-reported and measured sleep duration: How similar are they? *Epidemiology.* 2008;19(6):838–45. [PubMed: 18854708]

Table 1.

Socio-demographic Characteristics of the Sample of Korean American Immigrants

	Overall=343		Women (n=161)		Men (n= 182)		p
	N or Mean	% or SD	N or Mean	% or SD	N or Mean	% or SD	
Covariates							
Age (years)	40.93	9.85	42.6	11.02	39.4	8.43	0.003
Married (yes/no)	260	75.8%	124	77.0%	136	74.7%	0.621
Income < \$40,000	65	18.9%	33	20.5%	32	17.5%	0.492
Employed	189	55.1%	66	40.9%	123	67.5%	<0.001
Comorbidity	0.74	1.55	0.83	1.70	0.66	1.41	0.326
Sleep environment	17.43	6.46	16.86	6.41	17.93	6.48	0.125
Acculturation-related variables							
Age immigrated to U.S.	29.53	7.43	29.48	7.30	29.26	7.20	0.426
English proficiency	5.69	1.63	5.42	1.68	5.94	1.54	0.003
Korean neighborhood	0.39	0.48	0.44	0.49	0.35	0.48	0.114
Korean orientation	6.26	1.30	6.16	1.23	6.36	1.35	0.149
American orientation	4.27	1.52	4.13	1.52	4.39	1.52	0.118
Acculturative stress subscales							
Homesickness	2.02	0.73	2.16	0.77	1.89	0.68	<0.001
Social isolation	1.96	0.80	2.08	0.83	1.85	0.76	0.009
Employment barrier	1.64	0.78	1.79	0.88	1.50	0.66	<0.001
Discrimination	1.76	0.67	1.90	0.70	1.64	0.62	<0.001
Civic disengagement	1.65	0.85	1.78	0.94	1.54	0.74	0.008
Family problem	1.38	0.50	1.40	0.51	1.35	0.49	0.393
Sleep duration							
Habitual sleep duration (mins)	427.75	61.02	430.49	71.31	425.45	50.29	0.771
Habitual weekday sleep duration (mins)	416.85	65.37	422.96	74.03	411.76	56.25	0.260
Habitual weekend sleep duration (mins)	454.98	74.04	450.19	84.13	459.23	64.89	0.118
% of Short sleep (<6 hours)	37	10.7%	22	13.6%	15	8.2%	0.106

Correlations among Acculturation-related Variables, Acculturative Stress Subscales, and Sleep Duration in Korean Immigrant Women (n=161)

Table 2.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Korean orientation	1.00											
2. American orientation	0.03	1.00										
3. English proficiency	0.06	0.55**	1.00									
4. Age to the U.S.	0.04	-0.41**	-0.42**	1.00								
5. Korean neighborhood	0.04	-0.29**	-0.31**	0.04	1.00							
6. Homesickness	0.28**	-0.14*	-0.20**	-0.03	0.23**	1.00						
7. Isolation	0.11 ⁺	-0.06	-0.21**	0.02	0.17*	0.54**	1.00					
8. Employment barrier	0.02	-0.09	-0.20**	0.18*	0.15*	0.39**	0.42**	1.00				
9. Discrimination	0.10 ⁺	-0.17*	-0.21**	0.16*	0.07	0.31**	0.37**	0.51**	1.00			
10. Civic disengagement	0.20**	-0.19**	-0.19**	0.31**	-0.02	0.30**	0.15*	0.30**	0.47**	1.00		
11. Family problem	-0.02	0.04	-0.10	-0.09	0.16*	0.19**	0.18**	0.22**	0.32**	0.28*	1.00	
12. Sleep duration	-0.03	-0.05	0.16*	-0.40	0.19**	-0.16*	-0.15*	-0.09	-0.13*	0.01	-0.08	1.00

⁺ p<.1

* p<.05

** p<.01

Correlations among Acculturation-related Variables, Acculturative Stress Subscales, and Sleep Duration in Korean Immigrant Men (n=182)

Table 3.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Korean orientation	1.00											
2. American orientation	0.26**	1.00										
3. English proficiency	0.14*	0.46	1.00									
4. Age to the U.S.	-0.11 ⁺	-0.38**	-0.40**	1.00								
5. Korean neighborhood	-0.09	-0.22**	-0.25**	-0.02	1.00							
6. Homesickness	0.09	-0.10 ⁺	-0.20**	0.17**	0.07	1.00						
7. Isolation	0.06	0.01	-0.12*	-0.01	-0.03	0.51**	1.00					
8. Employment barrier	-0.05	-0.12*	-0.20**	0.27**	0.09	0.38**	0.25**	1.00				
9. Discrimination	-0.05	-0.14*	-0.16*	0.11 ⁺	0.05	0.42**	0.37**	0.53**	1.00			
10. Civic disengagement	0.03	-0.16*	-0.27**	0.25**	0.12*	0.29**	0.08	0.48**	0.45**	1.00		
11. Family problem	-0.14*	-0.01	-0.12*	0.04	0.16*	0.29**	0.18**	0.35**	0.25**	0.29*	1.00	
12. Sleep duration	-0.03	0.023	-0.02	0.03	-0.11 ⁺	-0.06	-0.13*	0.07	0.05	-0.05	0.01	1.00

⁺ p<.1

* p<.05

** p<.01

Table 4.

Multivariate Analysis of Associations of Acculturative Stress Subscales with Sleep Duration in Korean American Immigrants

	Women (n=161)			Men (n=182)		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Acculturative Stress subscales						
Homesickness	-12.63 (9.10)	-22.37* (9.27)	-23.19* (9.79)	-2.66 (6.88)	-3.95 (7.01)	-5.41 (7.23)
Isolation	-3.90 (8.51)	1.06 (8.78)	2.61 (8.69)	-11.58* (5.85)	-13.87* (5.78)	-13.73* (5.89)
Employment barrier	1.66 (7.89)	-1.13 (7.90)	0.68 (8.01)	9.72 (7.14)	9.85 (7.11)	8.85 (7.21)
Discrimination	-12.24 (10.42)	-13.60 (10.57)	-18.9 ⁺ (10.59)	10.11 (7.68)	10.02 (7.54)	10.49 (7.66)
Civic disengagement	8.90 (6.99)	18.96* (7.53)	17.75* (7.76)	-9.80 (6.03)	-7.02 (6.18)	-7.34 (6.35)
Family problem	-5.48 (11.67)	-8.80 (12.11)	-2.88 (12.34)	1.09 (8.23)	-0.10 (8.41)	2.42 (8.71)
Covariates						
Age		-2.08** (0.65)	-2.41** (0.75)		-0.02 (0.56)	-0.32 (0.61)
Income (ref: < \$40,000)		-14.63 (14.87)	-9.89 (14.75)		13.51 (11.07)	14.45 (11.36)
Employment status (ref: unemployment)		15.58 (12.26)	16.38 (12.39)		-20.02* (9.02)	-18.85* (9.31)
Marital status (ref: unmarried)		22.08 (14.70)	20.47 (14.59)		-5.67 (9.17)	-6.57 (9.58)
Comorbidity index		-3.50 (3.60)	-3.88 (3.61)		-3.64 (2.93)	-3.61 (2.97)
Sleep environment		-0.26 (0.98)	0.33 (0.99)		-1.32* (0.61)	1.33* (0.63)
Acculturation-related variables						
Korean orientation			-0.19 (4.88)			0.92 (2.90)
American orientation			-14.17** (4.72)			-0.27 (2.95)
English proficiency			5.84 (4.23)			-0.70 (3.05)
Age immigrated to the U.S.			0.43 (0.99)			0.74 (0.69)
Korean neighborhood (ref: not living)			-14.51 (12.39)			-8.94 (8.33)

⁺ p<.1

* p<.05

** p<.01

Model 1 = Six sub-scales of acculturative stress

Model 2 = Model 1 + Covariates (age, income, employment, marital status, comorbidity index, sleep environment)

Model 3 = Model 2 + acculturation-related variables (Korean orientation, American orientation, English proficiency, age immigrated to the U.S., and living in the Korean dominant neighborhood)

Table 5.

Sensitivity Analysis of Associations of Acculturative Stress Subscales with Sleep Duration in Korean American Immigrants

	Women (n=161)			Men (n=182)		
	Model 1 Odds (95% CI)	Model 2 Odds (95% CI)	Model 3 Odds (95% CI)	Model 1 Odds (95% CI)	Model 2 Odds (95% CI)	Model 3 Odds (95% CI)
Acculturative Stress subscales						
Homesickness	1.47 (0.71 – 3.02)	2.56* (1.08 – 6.07)	4.06* (1.33 – 12.37)	0.69** (0.25 – 1.91)	0.86 (0.25 – 2.94)	0.69 (0.16 – 3.04)
Isolation	0.90 (0.45 – 1.81)	0.64 (0.30 – 1.39)	0.67 (0.28 – 1.6)	3.87 (1.68 – 8.93)	5.57** (2.04 – 15.2)	6.86** (2.15 – 21.9)
Employment barrier	0.90 (0.47 – 1.71)	0.91 (0.44 – 1.88)	0.48 (0.18 – 1.27)	0.43 (0.12 – 1.53)	0.36 (0.08 – 1.66)	0.30 (0.06 – 1.47)
Discrimination	1.85 (0.82 – 4.17)	2.29 (0.84 – 6.21)	5.58** (1.64 – 19.02)	0.69 (0.22 – 2.24)	0.47 (0.10 – 2.21)	0.51 (0.08 – 3.14)
Civic disengagement	0.70 (0.38 – 1.30)	0.45* (0.21 – 0.94)	0.44* (0.19 – 1.04)	2.67* (1.11 – 6.43)	2.95 ⁺ (1.04 – 8.35)	2.97 ⁺ (0.93 – 9.48)
Family problem	1.74 (0.75 – 4.07)	2.23 (0.81 – 6.09)	1.44 (0.48 – 4.28)	0.43 (0.10 – 1.89)	0.34 (0.05 – 2.13)	0.31 (0.04 – 2.45)
Covariates						
Age		1.08* (1.01 – 1.14)	1.10* (1.01 – 1.20)		0.93 (0.84 – 1.02)	0.91 (0.79 – 1.04)
Income (ref: < \$40,000)		0.47 (0.11 – 2.05)	0.41 (0.07 – 2.40)		5.84 (0.68 – 50.25)	3.41 (0.31 – 38.05)
Employment status (ref: unemployment)		1.47 (0.47 – 4.63)	1.77 (0.45 – 6.98)		0.06* (0.01 – 0.68)	0.07* (0.01 – 0.94)
Marital status (ref: unmarried)		5.98** (1.54 – 23.24)	7.00* (1.44 – 34.14)		0.86 (0.16 – 4.54)	1.77 (0.24 – 12.76)
Comorbidity index		1.35* (1.04 – 1.74)	1.38* (1.01 – 1.91)		1.92** (1.24 – 2.96)	2.08** (1.25 – 3.44)
Sleep environment		1.03 (0.95 – 1.12)	1.02 (0.93 – 1.11)		0.93 (0.83 – 1.04)	0.94 (0.82 – 1.08)
Acculturation-related variables						
Korean orientation			0.64 (0.35 – 1.15)			0.97 (0.56 – 1.70)
American orientation			3.39** (1.64 – 7.01)			1.06 (0.65 – 1.72)
English proficiency			0.68 (0.40 – 1.16)			1.35 (0.80 – 2.26)
Age immigrated to the U.S.			1.06 (0.95 – 1.19)			1.05 (0.92 – 1.19)
Korean neighborhood (ref: not living)			0.27 ⁺ (0.06 – 1.11)			0.09** (0.02 – 0.50)

⁺ p<.1

* p<.05

** p<.01

Model 1 = Six sub-scales of acculturative stress

Model 2 = Model 1 + Covariates (age, income, employment, marital status, comorbidity index, sleep environment)

Model 3 = Model 2 + acculturation-related variables (Korean orientation, American orientation, English proficiency, age immigrated to the U.S., and living in the Korean dominant neighborhood)

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