Author's response to reviews

Title: Asian-White Differences in Short Sleep Duration by Industry of Employment and Occupation in the US: A Cross-sectional Study

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Version: 3  
Date: 2 April 2014

Author's response to reviews:

April 2, 2014

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Dear Dr. Brieger:

Thank you for your consideration of our manuscript, “Asian-White Differences in Short Sleep Duration by Industry of Employment and Occupation in the US: A Cross-sectional Study,” for publication in BMC Public Health. We are delighted to have the opportunity to provide revisions based upon the comments and recommendations of the three reviewers. Changes in the revised manuscript to address concerns raised are described here and highlighted in the text (where appropriate).

Reviewer Number: 1

1. Methods, Study Participants, p.5: It is stated that Non-Hispanic White and Non-Hispanic Asian adult NHIS respondents were included in the sample, and that data were extracted/compiled using the Integrated Health Interview Series. Were only Non-Hispanic White and Non-Hispanic Asian adult NHIS respondents included in the analytic dataset? I ask because it’s my understanding that in order to generate accurate variance estimates with NHIS data, that incorporate the complex sample design, users need to do domain/subpopulation analyses using the whole NHIS sample adult dataset rather than creating analytic datasets that only include the subgroups of interest (e.g., Whites, Asians). Perhaps this is...
what you did and you just didn’t explain it in the manuscript, but I wanted to clarify before deciding whether the methods were appropriate. Variance estimates should also account for the sample design variables “PSU” and “Strata”, which I presume you did.

Thank you for requesting clarification. The Integrated Health Interview Series merged the data, and we received data on all sample adults across the pooled survey years (2003-2011). We used the “subpop” command for all analyses. As suggested, we conducted subpopulation analyses among the entire NHIS sample adult dataset in our original analyses, and incorporated sampling weights in all analyses to account for unequal probability for selection to participate in the study, from non-response, and from oversampling of the elderly and racial/ethnic minorities in order to make appropriate inferences to the general US population. Therefore, the results include variance estimates that account for the sampling design. To clarify our methods in the manuscript, we added the following sentence: “The STATA “subpop” command was used for correct variance estimation of estimates, and different sampling designs in 1997 to 2005 versus 2006 to 2008 were accounted for by the Integrated Health Interview Series.” Also, the following original sentence is important for the reader to understand our procedures: “Participants were excluded from the study analysis if they had missing data on…”

2. Methods: It is unclear to me whether the analyses included all (White and Asian) adults, all adults who ever worked, or just currently employed adults. On p.5, it states that participants were excluded if they were “unemployed”; but, on p.7 it says “Adults who were either working at a paying or non-paying job during the week prior to the survey, who had a job or business but were not at work during the prior week, or who ever worked were asked about their occupation…”, which implies that former workers were included in the study. Also, if “unemployed” respondents were excluded, what about respondents whose employment status was “not in the labor force” (see p. 8)? I would suggest that analyses should focus on those who are currently employed since the study is looking at cross-sectional associations between sleep and work.

Thank you for requesting clarification. Our dataset included all White and Asian adults. We excluded from the final sample, the adults who were unemployed at the time of the survey. There are two separate variables that appear quite similar. Participants not included in the labor force were not included in our analyses. A participant was excluded from the analysis if they were unemployed. Since a person not in the labor force would not be employed at the time of the survey, they would not be included in the study. For greater clarity, we added the following statement about participants who were not in the labor force being excluded from the analysis: “Participants were excluded from the study analysis if they had missing data on sleep, industry and employment status, were deemed unemployed or not in the labor force…”

3. Results, Table 1: I would like to see a measure of the precision for the prevalence estimates in Table 1 (either standard error or 95% confidence intervals). Also, on p. 11 only the difference between the overall prevalence
among Whites and Asians is noted as statistically significant. Are the other differences mentioned (e.g., by education) statistically significant?

As requested, we have incorporated confidence intervals into Table 1 as a measure of precision, and so the statistical significance of each participant characteristic can be evaluated. Thank you.

Minor Essential Revisions (or Clarifications)

4. Introduction, p.3: Insufficient sleep should be defined in the first paragraph.

Thank you. We agree, and have included the following statement into the first paragraph of the introduction: “Insufficient sleep (<7 hours/day) has increased in the US over the past several decades, and has been shown to increase risk of weight gain and obesity, hypertension, diabetes, coronary heart disease and subsequent mortality [1-11].”

5. Introduction, pp.3-4: The transition/connection between race and occupation is unclear in this sentence: “However, there has been limited investigation by race although one’s occupation likely plays an important role in producing psychosocial stress and job strain that negatively impacts health through…”

Thank you. We modified the sentence: “There, however, have been limited race-specific investigations of sleep by industry of employment and occupation although important racial/ethnic differences in influential factors are likely to exist. For instance, one’s race/ethnicity as well as occupation likely plays an important role in producing psychosocial stress and job strain that negatively impacts health through, for example, discrimination or limited control over job demands/prestige as illustrated by the Karasek and Theorell demand-control model [20-22].”

6. Methods, Variable Measurements, Sleep Duration, p.6: It says that “adequate sleep was categorized as 7 hours”. Do you mean #7 hours, or were respondents who reported >7 hours of sleep excluded?

We focused on short sleep, which is considered <7 hours as recommended by the National Sleep Foundation because short sleep is associated with an increased risk of poor health outcomes (e.g. hypertension, diabetes, cardiovascular disease, premature mortality). We are using 7 hours of sleep as the reference, and not # 7 hours. We excluded participants who were long sleepers (>9 hours) because the potential mechanisms that link long sleep to poor health outcomes are believed to differ from short sleep. Also, short sleep has a clearer connection to occupational characteristics that impact health like long working hours, multiple jobs, and work-related stressors. Therefore, our study focuses on short sleep only.

7. Methods, Variable Measurements, Race/ethnicity, p.7: Is 24% Filipino (among Asians) representative of the U.S. population? It seems high. Also, although the Asian subgroups are too small to stratify all of the analyses by Asian subgroup, I think it would be informative to show whether the overall prevalence of short sleep duration varied by Asian subgroup (in Table 1).
Thank you for the recommendation. We did not stratify all variables by Asian subgroup in Table 1 because it would take up too much space in the table, which also includes additional white and total columns. We, however, were able to include this important information by including the following sentence to the manuscript: “Although the sample size was too low to stratify all analyses by Asian subgroup, the overall prevalence of short sleep duration varied by Asian subgroup with Chinese (prevalence (p)=23.6% [95% CI: 21.0-26.4]) and Asian Indians (p=23.6% [95% CI: 21.0-26.4]) having a significantly lower prevalence than Filipinos (p=37.4% [95% CI: 34.7-40.1]) and Other Asians (p=33.1% [95% CI: 31.0-35.2]).” We also added the following footnote to Table 1: “* Asian subgroups: Chinese (prevalence (p)=23.6% [95% CI: 21.0-26.4]), Asian Indians (p=23.6% [95% CI: 21.0-26.4]), Filipinos (p=37.4% [95% CI: 34.7-40.1]) and Other Asians (p=33.1% [95% CI: 31.0-35.2]).”

Regarding the apparent high prevalence of the Filipino population, Filipinos are the second largest Asian subgroup in the United States, and the largest group is Chinese-Americans. According to the CDC, the three largest Asian groups in the United States in 2011 were Chinese (4 million), Filipinos (3.4 million), and Asian Indians (3.2 million). These were followed by Vietnamese (1.9 million), Koreans (1.7 million) and Japanese (1.3 million). We checked our numbers, and they were correct. Our findings do not appear too divergent from what would be expected. Perhaps, the exclusionary criteria contributed to the final Asian subgroup prevalence.

8. Methods, Variable Measurements, Covariates, p.8: Please provide a reference for the different BMI cut-offs used for Asians.


9. Results, Asian-White Differences…, p. 12: In the 3rd sentence of the first paragraph, the words “the” and “in” are transposed.

Thank you. It has been changed in the manuscript. The sentence now reads: “Short sleep prevalence, however, was lower among Asians compared to Whites in the Accommodation and food services industry (PR=0.81 [95% CI: 0.66, 0.99]).”

10. Discussion, p.14: I think a citation is missing from the first (partial) sentence. Ref 18?

While we did not find a missing citation from the first sentence, we needed to insert an ‘a.’ The sentence now reads: “Our study, in combination with previous investigations, suggests that population patterns of sleep duration are likely influenced by a complex interplay between factors in the social and work environment [18, 35].”

11. Discussion, p.15: In the first full sentence there is an extra “have”.
Thank you for catching this mistake; it has been corrected.

12. Discussion. P.17: The statement “For instance, Japanese Americans have the highest SES...” needs a reference.


Discretionary Revisions –

13. Abstract, Background: I suggest changing “morbidity/mortality” to “morbidity and mortality”.

Done. The sentence now reads: “Although short sleep is associated with an increased risk of morbidity as well as mortality and has been shown to vary by industry of employment and occupation, little is known about the relationship between work and sleep among Asian Americans.”

14. Methods, Variable Measurements, Industry of Employment, p.7: I’m not sure I would call these “meaningful” industry categories. I don’t think I’ve seen industries grouped quite this way before.

We deleted the term “meaningful” from the description. The sentence now reads: “For employed sample adults, the North American Industrial Classification System (NAICS) Codes were categorized into 8 industry categories, which included:...”

15. Results, Table 1 and Table 3: Since it is not obvious how the occupation categories used were formed, it would be helpful to provide a footnote indicating which NHIS occupation recode values were included in each category.

Thank you for this comment. We added the following statement to the methods section of the manuscript that provides information regarding occupation: “Professional/management occupations included: Business and Financial Operations; Legal; Architecture and Engineering; Computer and Mathematical; Life, Physical, and Social Science; and Management. Support service occupations included: Education, Training, and Library; Healthcare Practitioners and Technical; Healthcare Support; Personal Care and Service; Community and Social Services; Sales and Related Occupations; Office and Administrative Support; as well as Arts, Design, Entertainment, and Sports. Laborers comprised participants in the following occupations: Protective Service Occupations; Food Preparation and Serving Related; Building and Grounds Cleaning and Maintenance; Farming, Fishing, and Forestry; Construction and Extraction; Installation, Maintenance, and Repair; Production; as well as Transportation and Material Moving.”

16. Results, Trends... section on p.13 and Figure 1: Since none of the trends were statistically significant, I’m not sure these results are worth including in the text and figure. Estimates are imprecise due to small subsamples of Asians in each industry category in each year.
The sample sizes for Asians within industries were large enough to get relatively stable estimates. We think it is useful and informative to provide the p-values showing that the p for trends were non-significant. We, however, have included a figure that omits the p-values in case the reviewer (or editor) feels strongly that the figure’s p-values should be removed.

17. Discussion, pp. 14-15: There is a suggestion that the prevalence of long work hours and shift work vary between Asian and White workers. A variable for work hours is available in the NHIS for 2004-2011, and a variable for shift work was included in 2010, so actual differences per NHIS could be reported. In fact, the prevalence of long work hours and alternative shifts among “Non-Hispanic Asian/Native Hawaiian or Other Pacific Islander” workers in 2010 has been published (See Table 2): Alterman T, Luckhaupt SE, Dahlhamer JM, Ward BW, Calvert GM. Prevalence rates of work organization characteristics among workers in the U.S: Data from the 2010 National Health Interview Survey. Am J Ind Med. 2013;56(6):647-59. http://onlinelibrary.wiley.com/doi/10.1002/ajim.22108/abstract

Thank you. The data for shift work was included in 2010, and was not available across our entire study period from 2003 to 2011. It is also important to note that we utilized the Integrated Health Interview Series to merge data variables, and shift work was not available for the study period from 2003 to 2011. We, however, included the prevalence of short sleep among White and Asian participants who worked at least 40 hours per week in Table 1. We also incorporated, into the discussion section of the manuscript, some additionally important information on work hours from a study that used 2010 data also from the National Health Interview Study: “A recent study using 2010 data from the National Health Interview Study found that whites (20.9 [20.0-22.0]) were more likely than Asians (16.6 [13.9-19.9]) to work at least 48 hours per week. Although non-significant, it appeared that whites (8.1 [7.4-8.8]) were slightly more likely to work at least 60 hours per week than Asians (5.9 [4.3-8.0]) as well as to engage in alternative shift work (28.1 [27.0-29.2]) for whites vs. 26.2 [22.8-29.8] for Asians). A similar proportion of whites (6.2 [5.6-6.8]) and Asians (6.7 [(5.0-8.8]) worked in temporary positions.” The following citation was incorporated into the reference list: “Alterman T, Luckhaupt SE, Dahlhamer JM, Ward BW, Calvert GM. Prevalence rates of work organization characteristics among workers in the U.S. data from the 2010 National Health Interview Survey. American journal of industrial medicine 2013;56:647-59.” We hope this is acceptable to the reviewer.

18. Discussion, Limitations, p.16: I believe that number of children in the household is available from the NHIS (in the person, family, or household file), so you could adjust for this if you so desire.

We utilized the Integrated Health Interview Series to merge the data variables, and the number of children is not available for the study period from 2003 to 2011.

Reviewer Number: 2
1. A person’s work hours is known as influential factors for sleep hours. Are there any information shown any differences in working hours between the groups by industries or occupations? If there any, authors should add in discussion. We agree that work hours can have an important influence on sleep. We included the prevalence of short sleep among White and Asian participants who worked at least 40 hours per week in Table 1. We also incorporated, into the discussion section of the manuscript, some additionally important information on work hours from a study that used 2010 data also from the National Health Interview Study: “A recent study using 2010 data from the National Health Interview Study found that whites (20.9 [20.0-22.0]) were more likely than Asians (16.6 [13.9-19.9]) to work at least 48 hours per week. Although non-significant, it appeared that whites (8.1 [7.4-8.8]) were slightly more likely to work at least 60 hours per week than Asians (5.9 [4.3-8.0]) as well as to engage in alternative shift work (28.1 [27.0-29.2]) for whites vs. 26.2 [22.8-29.8] for Asians). A similar proportion of whites (6.2 [5.6-6.8]) and Asians (6.7 [5.0-8.8]) worked in temporary positions.” The following citation was incorporated into the reference list: “Alterman T, Luckhaupt SE, Dahlhamer JM, Ward BW, Calvert GM. Prevalence rates of work organization characteristics among workers in the U.S.: data from the 2010 National Health Interview Survey. American journal of industrial medicine 2013;56:647-59.” We hope this is acceptable to the reviewer.

Reviewer Number: 3

1. I think, the study is incomplete and require either more analysis if that will be possible, or further consideration about another study (either lab or field sub study) where authors can fill out all missing information which they are mentioned in the long limitation list. For example, we have no idea how many Ss were shift / rotated workers, or having second job, or having little kids or care givers are present in the each sample. All these factors as well as those listed in the limitation list are very important to take into account prior to making any conclusions regarding the higher preferences for short sleep among Asians as compared to Whites.

The National Health Interview Survey serves to monitor the health of the US population, and does not collect data on an exhaustive list of characteristics that would be helpful to our specific research area (i.e. sleep disparities), but it serves as an important tool to spark further research. This study represents a descriptive epidemiology analysis that should be followed up with additional studies. Like every study, there are important limitations that need to be addressed by different studies. This study represents important work that should spark more research in the area. Therefore, our list of limitations can serve as important indicators of factors that need to be considered and addressed in future studies. While we do not believe this particular study is incomplete, we agree that studies that can address our limitations need to be addressed.

2. The current study does not present solid evidences and clear results regarding the cause of the short sleep, however, authors are trying to bring a stress as one potential factor, but I do not see the data regarding this measure.
This study cannot provide evidence of the causes of short sleep given the nature of the design (e.g. not a randomized controlled trial) and the data collected. We, however, describe the limitations of the study, and offer suggestions for further research.

3. Page 5: “... the interviewers did obtain information from each member of the sampled household on continuous basis each week”. The reader wants to know when interviews started, and how frequent per year they been conducted. Or it was just once a year?

Thank you for requesting clarification. The surveys were conducted once a year. For clarification, we modified the original sentence to read: “In short, an annual probability sample of households was interviewed by trained interviewers from the US Census Bureau on a continuous basis throughout the year to obtain information about health and other characteristics of each member of the sampled household.”

4. Page 6: how sleep duration was defined? It is not clear whether participants have been asked for how long they sleep per 24 hours (TST) including weekend, or how long they stay in bed (TIB) for 24 hours?

The participants were asked how long they sleep and not how long they stay in the bed. As mentioned in the manuscript, study participants reported the average hours of sleep they usually get in a 24-hour period. Interviewers were trained to report hours of sleep in whole numbers, rounding values of 30 minutes or more up to the nearest hour or otherwise rounding down. It should be clear that participants are not being asked how long they stay in bed for a 24-hour period because they are specifically asked about sleep and the time spent in bed is not mentioned.

5. Page 11: SD for age is missing

Thank you. We added the standard error for age. The sentence now reads: “Their mean age was 51 ± 11 years...” Please note that the standard error rather than standard deviation is provided because we cannot obtain standard deviations from a complex survey design.

6. Page 14: I would change the following sentence: Racial/ethnic health disparities are likely influenced by occupational environments AND stressors......”

Thank you. We agree, and have modified the original sentence to read: “Racial/ethnic health disparities are likely influenced by occupational environments and stressors in the workplace that may, for example, affect sleep quantity and quality.”

We hope that the recommendations and concerns raised in the review have been adequately addressed. Thank you for your consideration of this revised manuscript. We look forward to your decision.

Sincerely,
Chandra L. Jackson, PhD, MS (on behalf of all authors)
Postdoctoral Research Fellow
Harvard School of Public Health