Reviewer’s report

Title: Sleep Deficiency and Motor Vehicle Crash Risk in the General Population: A Prospective Cohort Study

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Reviewer: Donald Bliwise

Reviewer's report:

This is an interesting, timely, and nicely written report from the large US based Sleep Heart Health Study that demonstrates associations between several aspects of sleep, including sleep duration, daytime sleepiness and polysomnographically diagnosed sleep apnea, and motor vehicle accidents. Although this is an area that has seen some attention previously, the simultaneous availability of all of these measures involving sleep in a single cohort allows a more refined examination how each individually (and potentially interactively) might be related to MVAs. I have several comments about this work.

Driving safety is a major issue when discussing elderly populations, and this population, with an age range of 40-89 and a mean of about 65, almost certainly contains a large proportion of people over the age of 70 and even 80 years of age. In this age range, fitness to drive is most often considered in relation to cognitive capacity and to that end, one wonders whether cognitive function could be playing a role here, either as an uncontrolled factor or as a mediator for the observed sleep effects. Even for controlling for miles driven would not deal with this issue. Regardless of how much people actually drive, some individuals in this age range still driving may be relatively less fit to be driving because of impaired cognition. At least some of the feeder cohorts that comprise the SHHS (CHS, ARIC, subcohorts of Framingham) have such cognitive data available, and it would be worthwhile to try to control for cognitive function, even using relatively crude measures of mental status. If these data are not readily available, then perhaps the authors would consider stratifying their sample at the median (presumably about age 65, or even age 70) and repeat the analyses. Age was controlled for in the analyses as presented here originally (which is appropriate analytically), but stratification of the analyses would clarify whether age would act as an effect modifier of the various sleep variables. For example, if the magnitude of sleep effects was lower in the older, relative to the younger, cohort members, this might imply that impairments in cognition would be more relevant in the older group. On the other hand, equal (or stronger) effects of sleep variables would argue for the primacy of these sleep measures regardless of age. It may well be that sleep issues are more relevant for middle-aged and the "young-old" than for the "oldest old."
A few other comments about Methods as well:

MVAs are defined here via self-report on a questionnaire. There must be some published data comparing such self-reported MVAs against administrative data bases to report how accurate (or relatively inaccurate) such estimates may be. Please cite some of this literature. Related to this, how typical (or atypical) is a 6.9% rate of self-reported MVAs in a population of this age range? The authors may wish to cite some of the CDC data that could have bearing upon this topic (PMID: 23282860).

Although individuals treated for sleep apnea or receiving supplemental oxygen were excluded at Baseline (lines 107-108) the Flow Chart of enrollment and follow up does not explicitly state that this was also true at the 2 yr follow up, though one assumes that it would be. Please clarify this point.

Lines 120-130 present some comparisons between the 3,201 individuals that form the study cohort and individuals in SHHS who were not among the currently studied cohort. However, one cannot tell for sure from the manuscript whether these comparisons are between the 3,201 and the 1,431 who reported driving but who did not report miles per year or whether the comparisons are between the 3,201 and the 3,240 who were members of the original cohort who were not excluded for a variety of other reasons (many of which are enumerated in that section). Please clarify which set of comparisons is being presented here.

Related to the entry criterion of reporting average number of miles driven per year (line 124), reference to the SHHS questionnaire shows that data on driving mileage was gathered either on a per year basis (in miles) OR on an hours per day basis. As I understand the analyses here, persons who responded to this question only by indicating hours per day would have been excluded. Is that correct? If so, please state that and indicate how many people may have been excluded on that basis. One could imagine that individuals who answered this question as hours per day might indeed have been much more frequent drivers and had greater exposure than those answering miles per year. Please discuss this issue a bit and/or present some data bearing upon it if possible.

The Conclusions of the Abstract stray too far into causal attribution for a study that, although having a longitudinal component, is essentially descriptive epidemiology.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes
Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

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