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Letter to the Editor

Authors' Response to the Letter to the Editor: "Definition of Sleep Duration and Carotid Artery Intima Media Thickness: Caution for Risk Assessment"

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Authors' Response

To The Editor:

We appreciate the author's interest in our article [Ma et al., 2013], in which we reported a U-shaped association between objectively measured sleep duration and mean maximum intima media thickness (IMT) after adjusting for age. We also appreciate this opportunity to respond to the Letter to the Editor (Letter). Before responding to the specific points raised about our article, we would like to clarify that (1) our article was an original research paper rather than a "review" article as mentioned in the Letter, and (2) IMT was the outcome (i.e., dependent variable) in our analyses instead of "a risk factor" for cardiovascular disease as the author suggested in the Letter.

First, in the Letter, the author suggested that self-reported sleep duration should be compared with polysomnography (PSG), which is considered to be the gold standard, instead of using actigraphy data. While this would be desirable, PSG is normally used in a highly controlled laboratory setting, and generally is not feasible in population studies due to cost and participant burden constraints. Actigraphy was advantageous in our study for several reasons. Previous studies have reported that sleep duration varies by shift [Akerstedt, 2003]; therefore, it would be preferable to assess sleep duration over a complete shift cycle. We accomplished this by measuring actigraphy for 15 days. We could not expect the 464 shift working police officers to be subjected to PSG for such an extended period of time. Actigraphy has been recommended as a reliable tool to produce objective measurements of sleep and wake [Rupp and Balkin, 2011], and has been validated in shift workers [Reid and Dawson, 1999]. We agree with the author's recommendation that the overestimation of sleep duration by self-report compared with actigraphy should be validated using PSG. Other researchers may conduct this comparison using a different population where this procedure would be more feasible.

Second, the author of the Letter suggests that a risk assessment be performed. This was not the goal of our study. Regarding categorization of the independent variables, we agree that independent variables should be categorized according to valid criteria. When available, widely accepted clinical cutpoints can be used when they exist. To our knowledge, there is neither a gold standard nor a specific

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clinical cutpoint available for categorizing sleep duration. We used sleep categories based on the common approach in sleep-related research, with the goal of maximizing available sample size. We also agree with the author's comment that the recommendation for obtaining sufficient sleep duration as a possible strategy for atherosclerosis prevention should be viewed with caution (see our final sentences in the Discussion which emphasize this point). The author also suggested that we use "odd ratios or standardized regression coefficients to compare the predictive ability of several independent variables for IMT", yet the purpose of our study was not to compare risk factors for IMT, but was instead to assess whether sleep duration (the primary exposure variable of interest) was associated with IMT independent of other known risk factors.

Third, we fully agree with the author's final recommendation regarding assignment of causality to the association between sleep duration and IMT. In the Discussion section, we did point out that the cross-sectional design of our study would preclude making causal inferences and indicated the value of future prospective studies in this regard. We have discussed the potential role that obstructive sleep apnea syndrome (OSAS) might play in the U-shaped sleep and IMT association (see Discussion in our article). We appreciate the author's efforts to consider potential factors that might contribute to the U-shaped association between sleep and IMT such as the association of sleep duration with hypertension [Guo et al., 2013], and the association of OSAS with hypertension [Marin et al., 2012] and IMT [Ciccone et al., 2012].

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