Reviewer's report

Title: Allostatic load modifies the effect of blood lead levels on elevated blood pressure among middle-aged U.S. adults: a cross-sectional study

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Reviewer: Maggie Hicken

Reviewer's report:

In this paper, the authors examine the notion that social stress modifies the association between blood lead and elevated blood pressure. The authors operationalize social stress using a version of an allostatic load score. This paper provides a thoughtful contribution to the area of the social modifiers in environmental health. Moreover, given the paucity of nationally-representative datasets that contain both social and environmental measures, the authors use the NHANES in a creative manner to further this area of research.

Major compulsory revisions

1. The major problem that I see with this version of the paper is the operationalization of social stress with a version of the allostatic load score. In the abstract (summarizing the argument of the Background section), the authors state, “We conducted a cross-sectional study to determine whether chronic stress, operationalized as allostatic load (AL), modifies the effect of lead exposure on blood pressure among middle-aged adults.” Then, in the Background section, the authors state that, “Allostasis refers to how the body’s stress response systems regulate internal physiology in response to chronic exposure to physical, social, and environmental stressors.” [emphasis added]. Because of this definition, it is difficult for the reader to isolate the notion of allostatic load to social stress.

However, this problem can be circumvented by simply (relatively simply) reframing the Background section so that the focus is not on social stress, but on the notion of vulnerability to the hypertensive effects of lead. This vulnerability may stem from numerous sources to result in the physiologic dysregulation that can be operationalized by their version of the allostatic load score. For example, others have examined the notion that diabetes, for example, increases vulnerability to the health effects of environmental hazards. In the Discussion section, then, the authors can broaden their scope to link this work to the literature on the notion that social stress may increase vulnerability to the health effects of environmental hazards and the literature linking social stress to the notion of allostatic load.

2. There have been discussions in the epidemiology literature about the problems of endogeneity when adjusting for medication use. The authors were well-advised to run sensitivity analyses on the medication-free sample. However,
this introduces considerable bias as well. Rather, statisticians argue that less bias is introduced when adding 15mmHg to the SBP of those taking anti-hypertensive medication (Tobin, Sheehan et al. 2005). Does this measure of SBP alter the results?

3. How did the authors come to use their version of the allostatic load measure? In a recent review (Juster, McEwen et al. 2010), McEwen and colleagues listed the different permutations of the measure and the one used in this manuscript is different from all of those in the review. Is there a reason? Similarly, why was the median used as the threshold for "high" versus "low"? Can the authors report on sensitivity analyses using alternate thresholds?

Minor essential revisions

1. Why did the authors use a dichotomous outcome rather than continuous blood pressure? There is considerable loss of information that may have been helpful, particularly when running interactions.

Discretionary revisions

1. In the first sentence of the Background section, the authors state that "high blood pressure is . . . a major risk factor for hypertension. . . " . According to their JNC-VII citation, high blood pressure is hypertension in the sense that they are using it. If, for example, they were saying that a high blood pressure reading at a certain clinic visit may signify hypertension (because it may or may not), then I would agree. But in the more general sense, high blood pressure is hypertension.

References cited


Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.