Reviewer's report

**Title:** Structural equation modeling of parasympathetic and sympathetic response to traffic air pollution in a repeated measures study

**Version:** 1  **Date:** 24 February 2013

**Reviewer:** George Thurston

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The manuscript as presented is a mixture of numerous apparently conflicting results that the authors need to sort out better for the reader. The authors also need to note past work using a more common form of structural equation modeling (factor analysis), which has been applied in the past to relate multiple exposure variables with health variables. For example, the work of the EPA Workshop on the Source Apportionment of the Health Effects of PM (see Environ Health Perspect. 2005 Dec;113(12):1768-74) which summarized the results of time series analyses of health effects with source factors. To help the reader understand the differences between the approach taken and conventional factor analyses others have applied in the past, the paper should apply a conventional Varimax Factor analysis to the exposure data and apply that in the analysis, and the similarities/difference between that and the SEM used here noted.

As to the interpretation of the seemingly mixed results between SEM Traffic factor vs. BC, it seems likely that they can be interpreted as the difference between traffic in general (including NOx from gas combustion vehicles, with little BC emitted) and diesel PM (most closely associated with the BC variable). For example, past published analyses of urban elemental carbon samples, though not from Boston, has found that over 90% was due to diesel emissions in particular (J Expo Sci Environ Epidemiol. 2010 Jul;20(5):446-56.). Thus, the authors should consider the possible explanation for the seeming inconsistency between the SEM General Traffic health relationship with cardiac metrics, vs. for BC in particular, as indicating the higher toxicity of diesel traffic emissions vs. gasoline powered vehicle emissions.

**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