Reviewer's report

Title: Effect of Sunlight Exposure on Cognitive Function: a Cross-Sectional Study

Version: 1  Date: 23 January 2009

Reviewer: Nikolaos N Scarmeas

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This is a well-done and well-presented study. It examines cross-sectionally the relation between cognitive function and sunlight exposure in a representative cohort of community subjects. The authors report associations between sunlight and cognitive performance among depressed subjects (over and above demographic, socioeconomic and season adjustments).

The manuscript is clearly presented. Appropriate analyses methods have been used. The population is representative of many population strata and therefore the external validity of the study is high.

Issues that are of concern and should be addressed or commented on include the following.

Is there information on the type of depression (% of SAD etc)? It may be interesting to examine whether the associations apply to all types of depression or to SAD only. It may also be important to examine associations between insolation and depression symptoms in a continuous form. Medications used for depression (or other central nervous system acting drugs) should be considered. Actually the above may constitute an important confounder: could it be that among depressed subjects those with worse depression (i.e. those who endorse more depressive symptoms or take more antidepressant medications etc) happened to live in areas with lower insolation (and hence have worse cognition)?

The cognitive instrument should be described. Is immediate or long term recall assessed? The short length of the instrument is necessitated by the epidemiological large scale nature of the study but can only provide limited information regarding cognitive status. Which elements of the cognitive instrument relate more to the insolation and depression, the memory or orientation ones?

The association of insolation with the covariates needs to be presented either in a text or table form. Is insolation related to depression per se? Given the known associations between depression and cognition and depression and sunlight, the most parsimonious explanation for the findings is an effect of insolation to depression with a subsequent effect on cognition.

Some more practical interpretation – examples of insolation should be presented. For example what does 10000 J/ m2 correspond to (i.e. how many hours of sunlight without clouds under what regional or other climatic conditions)?

Given the literature on temperature and insolation and temperature and
cognition, should or could temperature be considered as a confounder?

The effect of season is simultaneously interesting and puzzling. The authors should include some literature review and attempt to offer some explanations for the finding.

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At the end of the 2nd paragraph of page 11 an incorrect attribution of cerebral blood flow as a potentially contributing factor for Alzheimer’s disease and Lyme disease are not explicitly stated but suggested. Although clearly lowering cerebral blood flow can be the cause of cognitive dysfunction (usually taking the form of delirium - encephalopathy or stroke-related cognitive dysfunction) current thinking considers low cerebral blood flow as the result of Alzheimer’s type pathological cerebral changes.

The issue of time spent indoors or away of the residence may be partially addressed by considering physical disability, arthritis, ability for transportation as recorded in functional ability scales (some of this information must be available in the REGARDS study).

Which one is the Keller et al 2005 reference in page 12 (the 1st?)?

Level of interest: An article of importance in its field

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