Author’s response to reviews

Title: Personal Ultraviolet Radiation Exposure in a Cohort of Chinese Mother and Child Pairs: The Chinese Families and Children Study

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Author’s response to reviews:

Dear Dr Szunyogova

Thank you for the opportunity to review the manuscript. I have done my best to address the external reviewer comments below. All editorial comments have all been adopted.

Kind regards,

Michael (Kimlin)

Reviewer comment: The manuscript had been improved but I am not sure that some of the issues highlighted in both reviews had been fully addressed. In particular, I refer to the statements that the answers to a number of comments will be presented in future publications and not here - it was a review of this particular manuscript and not future unknown ones. I also agree with other Reviewer that the results as they are presented in this paper could be considered as validation or feasibility of suggested study protocol but not as inter-comparison of multiple variants as manuscript reported very limited analysis of collected data. At the same time, I'd like to stress that these comments relate to this manuscript only and don't reflect the objectives and quality of the project itself, which is very important and timely.

Author response: Whilst this is an interesting comment, it has no relevance to this manuscript.

Reviewer comment: It is repeatedly stated that the study identified a strong regional variation in time spend outdoors and personal UVR exposures whereas the reported data don't support this statement: it can't be de-coupled from rural vs urban locations and corresponding differences in lifestyle and commitments.

Author response: There are strong regional differences in exposure, as outlined in the data and justified in the manuscript.

Reviewer comment: I am still not convinced in logic of 14 days averaging of doses and not using 7 days mean for the week closest to the data collection period. It is also not clear why 3 days or personal dosimetry are averaged, considering that one the days was weekend and other two - weekdays, with potentially very different time available to spend outdoors. No explanation of the rational is given.

Author response: In this manuscript we are investigating average exposures, rather than day-to-day fluctuations in exposures. Hence, the averaging of the measures.
Reviewer comment: Poor correlation between questionnaires and measured doses may be also
due to the timing of exposure: even long exposures later or earlier in the day may result in low
recorded doses.

Author response: We have published extensively on this issue (References #5, #22, #23), and it
is not the focus of this paper.

Reviewer comment: Statement that polysulphone dosimetry is the gold standard for measuring
solar UVR exposure is far too strong and technically incorrect.

Author response: The overwhelming literature clearly states no other technology matches this
technique. (References #28, #33, #34…etc)

Reviewer comment: Polysulphone is a useful tool, especially when used with well validated
questionnaires but it records time-integrated exposure only, doesn't provide any information
about timing of exposure and requires individual dosimeters for each exposure day. UV data
loggers give more detailed information - when spectroradiometers are not practical.

Author response: UV data loggers have errors of over 100%, due to cosine, temperature and
calibration issues. Hence, they were not used.

Reviewer comment: Advantages of personal dosimetry using polysulphone over satellite data
and limitations of satellite data (lines 145-146) are arguable: satellite data do reflect local
environments at specified time and location; radiation transfer models do take into account
variation of clouds, aerosols and ozone column through the day, they are validated by ground
measurements across the globe. In some cases, polysulphone may be more practical and better
option for large population studies than the use of satellite data but not necessary for reasons
stated here.

Author response: This is a comment rather than a question. I am unable to answer.

Reviewer comment: Lines 281-291. It is true that exposure to 4.5 MED far exceeds the
recommended daily limit for outdoor workers; however, it is exposure of unprotected skin.
Values measured by polysulphone dosimeters relate to exposures of unprotected skin, as authors
mentioned themselves. Statement that personal exposures (e.g. exposure of unprotected skin) of
rural mothers is too high is not supported by presented data. Personal exposures shown in Fig.3
for the week ~ 31 May 2012 are significantly lower for both locations while ambient values are
not too dissimilar to periods before and after this week. No explanation is suggested.

Author response: Differences in exposure were found, as outlined in the data and justified in the
manuscript.
Lines 301-306. The following text has been added… “As some rural mothers worked outdoors all day, this very high value could be expected. This high level of UVR exposure may have significant health implications, if sustained over the long term on unprotected skin or eyes (34). We found only a relatively small percentage of rural mothers used sunscreen (17%) or hats (27%), hence many rural mothers may receive significant UVR exposure to the face. If further diary analysis reveals a lack of clothing cover (i.e. high skin exposure) on days of high UVR exposure, many rural mothers may be receiving a concerning personal UVR dose.”

Reviewer comment: Fig.2 and 3 combine information about mothers and adolescents for two locations, e.g. 4 variables, and should be split to present comparison of one of the variables at a time.

Author response: We believe that the Figure is best presented in its current format.

Editorial comments

Reviewer comments: Line 111. Delete field before doctors.

Author response: Cannot find the term “Doctors” on Line 111, however, removed the term from Line 109.

Reviewer comment: Line 171. Delete or Joules per meter squared (j/m2).

Author response: J/m2 Deleted (Line 169)

Reviewer comment: Line 194. Delete comma after on average

Author response: Deleted.

Reviewer comment: Lines 223-226. Difficult to follow sentence, needs re-wording.

Author response: Line 224. “There was substantial difference between the two locations in the average personal UVR dose received, as measured by dosimetry (Table 4, Figure 3). Mothers in the rural location received an average of 4.53 MED (range 0.54 to 12.58), which is almost six times the average daily UVR exposure of 0.78 MED (range 0.06 to 2.43) received by mothers in the urban location” was replaced with,
“There were differences between the two locations in the average personal UVR dose received (Table 4, Figure 3). Mothers in the rural location received an average of 4.53 MED (range 0.54 to 12.58), which is almost six times the average daily UVR exposure of 0.78 MED (range 0.06 to 2.43) received by mothers in the urban location.”

Reviewer comment: Lines 228-230. Technically inaccurate wording: MED is used instead of exposure - MED as minimal erythema dose was assumed to be identical but exposures differed.
Author response: Line 229. The wording has been changed from “MED dose” to “exposure”, such that it now reads…

“There are differences in the urban location received about one half, and one quarter, respectively, of the average exposure of their mother.”

Reviewer comment: Line 264. Difference in dates of data collection is not "slight", in particular - between early April and late May.
Author response: Line 277 – “Slight” was deleted

Reviewer comment: Line 286. Personal exposure of 60% of ambient value seems to be much higher proportion than reported elsewhere. Please explain.
Author response: This related to the individual dose of a participant being 60% that of the ambient UV radiation.

Line 301. The following sentence has now been added. “As some rural mothers worked outdoors all day, this very high value could be expected.”

Reviewer comment: Line 294. Greenhouse-related activities are more likely indoor than outdoor.
Author response: Line 308. The term “greenhouse” was deleted. I can understand where the confusion lies, however, these greenhouses had opened sides.

Reviewer comment: Line 359. Please explain relevance of fitting dosimeters over thick winter clothing for measurements of erythema effective UV: thick winter clothing suggest no exposed skin, very low ambient UVR and shorter exposures unless involved in winter sports at high altitudes.
Author response: We found that some participants were still wearing jackets in spring, however jackets were often put on and taken off multiple times per day, depending on the activity. The dosimeter band should easily and comfortably accommodate being worn over jackets, to ensure participants get into the pattern of wearing the dosimeter all day, regardless of clothing worn.
Line 374. To remove confusion we have replaced “thick winter coats” with “jackets”.

Reviewer comment: Line 368. Use of sunscreens could result in the same exposure reduction as clothing.

Author response: Line 382: The following text has now been added “…or is well-protected by broad-spectrum sunscreen”

Reviewer comment: Line 399. What does utility mean in this context?

Author response: Line 414. “Utility” on Line 404, has been changed to “usefulness”

Reviewer comment: Fig.2 and 3 have the same titles of Y-axis: Personal UV exposure (MED/day) while Fig.2 represents ambient values as stated in the capture. Please correct. Author response: The Figure has been updated.