Reviewer’s report

Title: In-utero exposure to phenols and phthalates and the intelligence quotient of boys at 5 years

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Reviewer: Aimin Chen

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The study is among the first to study prenatal exposure to phenols and phthalates in France and child IQ in early school age, among boy only. The study is generally well conducted, however, significant limitations exist in the design and analysis that should be addressed or discussed in the context.

1. The boy only cohort does not bias the results in boys, but the interpretation of the results should only be limited to boys. The conclusion cannot be extended to girls.

2. One time measurement of these chemicals or metabolites has inherent limitation that should be fully discussed in the discussion section. The lack of additional measurements during pregnancy and the lack of postnatal measurements will limit the generalizability of the results to entire pregnancy and in the context of both prenatal and postnatal exposure.

3. The PubMed has collected more studies on these chemicals and IQ, particularly BPA and phthalates, including Stacy SL et al (Environmental International 2017) and Braun et al (Neurotoxicology 2017). A new search of literature is needed and the claim of "the first" study may need to be reconsidered. These new studies should be included in the discussion of results.

4. While SEM has advantages to use latent variable to reduce the number of models used, multiple analytical methods may provide more convincing results. The lack of sensitivity analyses with other modeling techniques is a limitation. To reduce the dimensionality of exposures, summary exposures by sum, principal components, weighted quantile sum, or other methods may be considered as alternatives. Full scale IQ will reduce the dimensionality of IQ outcomes.

5. Linearity of the association should be examined using quartile or spline regressions. SEM only assumes linear associations.

6. The call for future study direction is unclear, as the findings from this study will lead to more discussion of exposure levels/range, windows of sensitivity, gender-specific associations, and co-exposure effects.
7. The use of literature based ICC for correction of regression coefficient may be problematic. The enlargement of regression estimate for chemicals with low ICC could be prone to error.

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