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### E-cigarettes are less harmful than smoking

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## E-cigarettes are indeed less harmful than smoking

Your Editorial<sup>1</sup> criticising Public Health England's review of electronic cigarettes focuses on three supposed short-comings of the paper by Nutt et al<sup>2</sup>: (1) lack of evidence, (2) reliance on the opinions of participants, and (3) potential bias arising from the selection of participants and conflicts of interest by some of the experts. As authors of the original paper, we find these three criticisms have over-generalised the evidence issue, failed to respect the knowledge and experience of the experts, and did not take into account the many measures to minimize potential bias.

First, the lack of evidence. That criticism does not apply to smoked cigarettes and e-cigarettes. There is abundant evidence about the harm of cigarettes. The paucity of evidence for serious harm to users of e-cigarettes over the years since they were first marketed in 2006, with millions purchased, is itself evidence. In addition, biomarkers of potential future harm are broadly reassuring<sup>3-5</sup>.

Second, reliance on the opinions of the participants. The approach we used in the study, decision conferencing<sup>6</sup>, sought from participants their expert judgements, not opinions. The criteria and their definitions were taken from three drug harm studies, the ACMD's original formulation<sup>7</sup>, the 2010 study of UK drug harms published in the Lancet<sup>8</sup>, and the 2013 replication for EU drug harms<sup>9</sup>. Judgements about scores were based on data along with our knowledge and experience of the degree of harm, and plausible causal mechanisms for the harm. When data were available, they were discussed openly by the group for their validity and reliability. When data were sparse or lacking, we relied on logical inferences (e.g., the dearth of evidence of dying directly from an overdose of smoking led us to infer that cigarettes are not very harmful on that criterion, so we gave it a low score, but we assigned e-cigarettes a higher harm score for that effect because the nicotine solution in the cartridges could potentially be directly accessed). A strength of the multi-criteria decision analysis (MCDA) model<sup>10</sup> is that it incorporates both the data and judgements about the relevance of the data, thus capturing meaningful differences in the relative importance of the effects.

Third, bias in the experts. We selected participants who are recognised as experts by their publications, experience and generally-acknowledged professional standing, bringing diverse perspectives and expertise that could be relevant to assessing the harm from nicotine products. We included experts in behavioural pharmacology, legal aspects of tobacco control, smoking policy, toxicology, neuro-psychopharmacology, psychopharmacology, public health sciences and internal medicine, who collectively have published over 300 scientific publications relevant to understanding nicotine and tobacco harm. It was misleading of the Lancet to characterise the authors as having "no prespecified expertise in tobacco control" as the project was about relative harms of nicotine products not tobacco policy.

As for conflicts of interest, the decision conference process is designed to ensure that participants of different persuasions challenge each other, and the facilitator asks participants giving judgements to support them with studies, data or experience. The facilitator ensured that peer review operated on-the-spot as the MCDA model was created in a step-by-step, structured process<sup>10</sup>. Consistency

checks and sensitivity of overall results to the input scores and weights were thoroughly explored, with model results found to be very robust to imprecision in the data and the few disagreements among the experts. These procedures made it impossible for a single participant with a potential bias to have any meaningful influence on the process outcome.

Potential sources of conflict of interest were disclosed at the meeting, and those in the prior three years were disclosed in the published paper. We were informed by EuroSwiss Health that they have no funding from any tobacco or e-cigarette company; this was a requirement for accepting their funding. Funds provided were not from tobacco or e-cigarette companies, and as stated in the paper, EuroSwiss Health and Lega Italiana Anti Fumo (LIAF) had no influence on the MCDA process.

We are confident that the nicotine products study applied an appropriate structured process with a requisite diversity of experts who engaged in constructive discourse in building a model that represented the most scientifically sound assessment of the relative harms of nicotine products. Our model's results for harms to the user provided Public Health England with the basis for their correct calculation of the estimate that e-cigarettes are 95% less harmful to the user than smoking. Or, as we prefer, smoking is estimated to be 20 times more harmful to the user than vaping.

(745 words)

## References

1. The Lancet. E-cigarettes: Public Health England's evidence-based confusion. *The Lancet*. 2015 **386**: 829.
2. Nutt DJ, Phillips LD, Balfour D, Curran HV, Dockrell M, Foulds J, et al. Estimating the harms of nicotine-containing products using the MCDA approach. *European Addiction Research*. 2014; **20**: 218-25.
3. McRobbie H, Phillips A, Goniewicz ML, Smith KM, Knight-West O, Przulj D, et al. Effects of switching to electronic cigarettes with and without concurrent smoking on exposure to nicotine, carbon monoxide, and acro-lein. . *Cancer Prevention Research* 2015; **8**: 873-8.
4. Hecht SS CS, Kotandeniya D, Pillsbury ME, Chen M, Ransom BW, Vogel RI, Thompson E, Murphy SE, Hatsukami DK. . Evaluation of toxicant and carcinogen metabolites in the urine of e-cigarette users versus cigarette smokers. *Nicotine Tob Res*. 2015 **17**(6): 704-9.
5. Farsalinos KE, Polosa R. Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review. *Therapeutic advances in drug safety*. 2014; **5**(2): 67-86.
6. Phillips LD. Decision Conferencing. In: Edwards W, Miles RF, von Winterfeldt D, editors. *Advances in Decision Analysis: From Foundations to Applications*. Cambridge: Cambridge University Press; 2007.
7. Advisory Council on the Misuse of Drugs. Consideration of the use of Multi-Criteria Decision Analysis in drug harm decision making. London: Home Office; 2010.
8. Nutt DJ, King LA, Phillips LD, on behalf of the Independent Scientific Committee on Drugs. Drug harms in the UK: a multicriteria decision analysis. *The Lancet*. 2010; **376**(1558-65).
9. van Amsterdam J, Nutt D, Phillips L, van den Brink W. European rating of drug harms. *Journal of Pharmacology*. 2015; **29**(6): 655-60.
10. Dodgson J, Spackman M, Pearman A, Phillips L. *Multi-Criteria Analysis: A Manual*. London: Department of the Environment, Transport and the Regions, republished 2009 by the Department for Communities and Local Government; 2000.

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The 12<sup>th</sup> author, Anders Milton, was not available for a reply.