

## When vaping lobbyists get science wrong – reply to Poirson

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Thank you for giving us the opportunity to respond to the comments by Philippe Poirson [1] on our study [2]. Although the tone of unfounded reproach is, in our view, not the way scientists should communicate and not helpful for a scientific debate, we are grateful for being able to clarify various issues that were mistakenly interpreted on several occasions (see for example [3]).

First at all, C-SURF, the project from which our data for the present study came, is funded by the Swiss National Science Foundation, an independent organisation and not a federal governmental agency. Thus, there is no federal science muffling. Second, our results do not contain errors or methodological biases, as we are reproached by Poirson, nor is our conclusion “abusive” (although the language used by Poirson is). Our conclusion states that WE found no beneficial effects, and of course this refers only to OUR study among young men. We are not claiming that there are generally no beneficial effects in other studies all over the world. Additionally, we cautiously chose this wording to avoid saying that there were detrimental effects. This cautious statement has also been commented on as an understatement of some actually negative effects [4]. We have even discussed the potential for beneficial effects (e.g., more quit attempts) in our paper.

We are fully aware, on the one hand, that there is a heated debate on e-cigarette use. On the other hand, Poirson should also acknowledge that there are systematic reviews confirming our findings [5, 6], although these have also been criticised by those more in favour of vaping. Hence, there is at least no unequivocal view about the effectiveness of e-cigarettes for smoking cessation. The selective choice of two, apparently real, longitudinal studies [7, 8] does not dismiss our findings. We have never claimed that there cannot be other studies with different findings. It is common in research that not all studies converge on a unanimously agreed finding. By the way, both “real” longitudinal studies used intensity/frequency measures of vaping measured at follow-up only, something we have been criticised for

by Poirson. Additionally, Hitchman et al. [8] showed that baseline vapers were less likely to quit smoking, although not significantly so, but again at least no beneficial effect of baseline vaping could be found. Most of the statements made by Poirson are not comments on our study, but seem to promote other studies with different findings and different populations.

We have by no means tried to hide that vaping status was not assessed at baseline. This was mentioned at several places in our paper. However, this does not make our study a cross-sectional study. We measured changes in smoking status, and changes in number of cigarettes used between baseline and follow-up. In addition, we do not think that measuring vaping status at baseline would have changed our results, as most participants were probably non-vapers at baseline. As Kuendig et al. [9] have shown, e-cigarette use more than doubled between 2013 and 2014/15. Given this exponential growth (and we discussed other indicators confirming such a growth), it is very unlikely that there would have been many vapers at baseline (which was years before 2013) and, thus, the large majority would have become vapers between baseline and follow-up. Thus, we mainly analysed whether those becoming vapers reduced their use of cigarettes or stopped smoking compared with those not becoming vapers. We acknowledge, however, that this is not an optimal design. Nevertheless, we cannot see how our finding can be interpreted in another way than that vaping had no beneficial effect on conventional smoking in a population of young men as a whole.

Our critic seems to make four fundamentally flawed pre-suppositions:

- a) that a study among young people has to support the same conclusions as studies among older people or in the general population at all ages;
- b) that an epidemiological study on general use of e-cigarettes must reach the same conclusions as smoking cessation trials among heavy smokers;

- c) that data need to be broken down (heavy smokers that at some point in time become daily vapers using 3rd generation vaping tanks) until the desired effect is found;
- d) and that we should overload an article by plugging in all the many analyses that he would like to see.

Young people may use e-cigarettes for reasons other than long-time heavy smoking, such as for enjoyment, because of curiosity, novelty, role modelling celebrities or just because it is fancy [10, 11]. For example, Saddleson et al. [11] showed that young adults reported e-cigarettes use more often for enjoyment reasons than for quitting smoking, as opposed to older adults who often report using e-cigarette to stop smoking. Moreover, Hitchman et al. study [8], quoted by Poirson, showed that the 3rd generation tanks, the more effective vaping tool for smoking cessation, were most often used by older people and least by the youngest. Thus, there may be differences between young vapers and older long-term smokers, who more often may use vaping for smoking cessation. Our study is an epidemiological study among young men. As shown by the Swiss monitoring system [9] e-cigarette use is most prevalent among the youngest (15–19 years old), and then strongly decreases with age. If this age group is using e-cigarettes intermittently (stated by Poirson to be 88%), why should we focus our findings on the minority of daily users? Poirson accuses us of hiding findings on daily use, but again, as rightly said by Poirson, these findings were already published in 2013 [12] and we correctly referenced this study. Why should we reproduce these findings again in a second article? We do not think that these data have disappeared only because they were not repeated. In addition, a secondary analysis of the more detailed data on daily vapers in our cohort [12], which were also shown by Poirson on the webpage Vapolitique [13] as a criticism (3 daily vapers among 22 ex-smokers; 27/222 among smokers), revealed that daily vapers were not significantly more likely than nondaily vapers ( $p = 0.841$ ) to be ex-smokers. Moreover, as shown in the original publication [12], no statistically significant difference was found between daily vapers and non-vapers in the number of cigarettes smoked per day, for the level of nicotine dependence, and the number of quit attempts in the past 12 months. Hence, again no beneficial effect was found.

Poirson seems to want us to break down data until we find a subgroup where vaping may have beneficial effects (e.g., heavily dependent smokers who are daily vapers using 3rd generation kits). However, this does not reflect the situation of current e-cigarette use among young Swiss men altogether. Thus, we looked at the total population of young male vapers, the way they are using e-cigarettes and the generation of e-cigarettes that they were using. For this representative sample of young Swiss men, we could not find any beneficial effect of e-cigarette use overall. We do not doubt that there could be beneficial effects of vaping among some highly selective subsamples, but it seems not to be the case for the large majority of young male vapers in Switzerland. If we want to show the effect of alcohol use on health overall, we would also not restrict the sample to those drinking only 1 glass of wine every other day, because these particular alcohol users may be the most likely

to have overall beneficial outcomes on mortality and morbidity as a result of cardioprotective effects.

Our study was not done to add to the two smoking cessation trials of the quoted Cochrane review [14], which, by the way, drew very cautious conclusions from the two nonsignificant studies included, nor can a single article fully capture all the analyses on social pressures, smoking relatives, stigmatisation social-professional status, health status, comparison of Swiss with foreigners, and concomitant use of other psychoactive substances, suggested by Poirson. To the best of our knowledge, we have not yet seen a single article covering all these topics.

Poirson seems to criticise our sample because it consists of only young men and therefore is biased. Well, it is true that it consists of only young men, but there are many studies on vaping using only subsamples of the total population. Our sample covers 21 of 26 cantons and has a retention rate of over 90%. It includes all sociodemographic subgroups of men of this age and is therefore certainly less biased for this population compared with well-affiliated college samples. The study may also be less biased than studies, obviously preferred by Poirson, with a follow-up of around 50%, such as the Biener and Hargraves [7] study, or even less, as in the Hitchman et al. [8] study. Similarly, Etter and Bullen's [15] study described by Poirson as a "real longitudinal study" reports lower response rates than C-SURF (i.e., 62% for 1-month follow-up and 47% for 1-year follow-up). Moreover, this study may also be subject to bias because participants may have had special affinities for e-cigarettes since they were enrolled on websites dedicated to e-cigarettes and smoking cessation. This sample may be biased because vapers not interested in stopping smoking may be under-represented. Also, since the sample comprised vapers only, it was not possible to compare smoking cessation rates between vapers and non-vapers.

Poirson seems to confuse selection bias with generalisation to a larger population. However, our study is restricted to young men. We cannot see that studies looking at subsamples such as young college students or school students should be abandoned or are biased, because the sampling frame is restricted, as long as they do not generalise findings to all other parts of a population. We carefully discussed the point of having a bounded population and we never claimed overarching conclusions or generalisations to other segments of the population. We did not "evacuate" health benefits of vaping compared with smoking, but largely discussed this in the introduction, and we did not give only one reference, but many. We clearly stated that vaping is less harmful than smoking, but we did not analyse all potential health benefits separately, and the paper was not intended to analyse effects on asthma as suggested by Poirson.

Poirson seems to be very concerned about the seeming prohibition of vaping liquids. However there is no prohibition in Switzerland. It is legal to consume these liquids. They can be bought across the border (and in Switzerland nobody lives far away from borders) and they can also be legally ordered via the internet. In fact, we even tested direct supply in Swiss shops. You can simply order e-liquids via the internet, providing the mailing address of the shop. The shops then "privately" exchange your ordered e-liquid

arriving later with e-liquids from their existing “private” stock. Nevertheless, we agree that this sale regulation may limit the use of e-liquids with nicotine in Switzerland. Data from the Swiss monitoring of addiction [16] showed that in 2013, only 29.7% of e-cigarette owners used nicotine e-liquids, but also that the prevalence of users of nicotine e-liquids has increased since then [9]. Additionally, the benefits of using nicotine e-liquid on smoking quitting and reduction may not be as clear as suggested by Poirson. The results of the Cochrane meta-analysis [14] cited by Poirson to support his assertion are based on only two studies, both yielding nonsignificant results when taken separately, and the quality of evidence was rated as low. Moreover, when discussing potential benefits for daily heavy smokers, one may also wish to include potential harms by adding nicotine via vaping among infrequent smokers or even non-smokers, who are often not included in studies that follow only heavy smokers who want to quit or reduce smoking by means of vaping.

We will not discuss all the flaws included in the studies referenced by fact sheets, vaping lobbying pages or Power-Point presentations, and we do not understand the connection with medically prescribed heroin substitution, which was made available for dependent heroin users and had no youth-oriented marketing. We are, however, clearly in favour of prescribed nicotine replacement products, with costs even being covered by health insurance in Switzerland. Such nicotine replacement might also include nicotine liquids. We are also aware that future measurement in C-SURF must be refined to include different generations of e-cigarettes, nicotine-free versus nicotine-containing liquids, and motives to use these products. This is under way with the 2nd follow-up of C-SURF, for which data collection has just started. We strongly protest against being portrayed by a vaping lobbyist as loyal assistants of official federal science who are ideologically blind toward harm reduction strategies.

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