Commentary on the Tétreault et al. 2012 article "Risk Assessment of Aircraft Noise on Sleep in Montreal"

Dear Editor:

In their 2012 study, Tétreault et al.¹ attempted to estimate the percentage of the population residing near Montreal–Pierre Elliott Trudeau International Airport affected by aircraft noise. The night-time noise levels were estimated using aircraft movements from the 2009 NAV Canada database and INM software application. This database gives the departure and destination but not precise flight trajectories. This underlines the authors' inability to precisely estimate noise levels at night, a situation which can invalidate their conclusions as these are sensitive to small changes in maximal sound levels.

The authors estimated the number of exposed individuals using the number of residential buildings and the average number of residents-per-building in each municipality. This approach disregarded the demographic variability within each municipality. The authors also used a questionable mix of estimates taken from different years, namely the 2010 municipal property tax records, the 2006 Canadian census data, and the 2009 NAV Canada database. This methodology can also invalidate their conclusions.

They attempted to estimate the likelihood of at least one awakening per night in addition to spontaneous awakenings based on Basner et al.² To our knowledge, there is no study establishing above which given number of additional awakenings per night long-term health risks become significant. The authors of that very study^{2,3} warned against extrapolating their results to populations other than the study population. That same study included a significant selection bias since 75% of participants described themselves as moderately to very strongly annoyed by aircraft noise (as opposed to 15% in the general population). The parameters used to calculate the noise dose-response curve for night-time awakenings overestimate the disturbance effect of noise on sleep. The calculations used as the basis for that curve assume constancy of spontaneous awakenings, when in fact those awakenings vary significantly during the night.⁴ These experimental limitations are very important to consider for the Tétreault et al. study¹ as aircraft movements are not uniformly distributed throughout the night. Using a tool that overestimates risks when the estimated risks remain low raises significant concerns.

Moreover, Tétreault et al.¹ justify using an attenuation factor of 15 dB between indoor and outdoor noise levels based on Basner et al.² However, this choice is not experimentally supported, does not constitute an accepted norm, and would imply that windows are open at all times. In cold countries such as Canada, windows are closed most of the time and this factor is closer to 26 dB.⁵ The attenuation factor of 21 dB recommended by the WHO takes into account window-opening behaviours. When this factor is used, no individual living near Montreal Airport appears affected by noise at night.

Given all the uncertainties associated with the authors' estimates, carefully designed field studies with indoor noise and validated sleep measurements are required before such conclusions as they have drawn can be made.^{2,6} Although it is important to question the clinical implications of noise produced by various sources of urban activities, a variety of confounding factors must be carefully considered before reaching conclusions which have substantial societal implications.

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Conflicts of Interest: D.B. Boivin is Founder/CEO of Alpha Logik Consultants Inc. She served as a scientific expert for Aéroports de Montréal. J. Savard is Director of Acoustics and Vibrations for SNC-Lavalin Inc. He served as a scientific expert for Aéroports de Montréal. SNC-Lavalin was also given a contract by the Direction de Santé Publique de Montréal for the modeling of noise levels for their study on sleep disturbance around the Montreal-Trudeau airport.

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