Assess Ventilation When Determining Safe Distancing in Schools to Control COVID-19 Transmission

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Dear Editor,

We read with interest and are responding to the recent paper by van den berg et al.[1] This statewide study compared COVID-19 transmission incidence rate ratios for students and staff in Massachusetts on a district level based on reported distancing practices of 3 ft or 6 ft spacing with other mitigation measures, such as universal masking, implemented. The authors concluded that the difference in rates was not statistically significant at the 0.05 level, creating the impression that 3ft spacing is just as effective as 6 ft spacing in preventing COVID-19 transmission in elementary schools. As practicing Certified Industrial Hygienists and Occupational Medicine Physicians working with school districts to reduce COVID-19 transmission risk, we believe the limitations inherent in this study should be clarified before becoming the basis for practice or public policy.

This is an "ecologic design" associating outcome (COVID-19 positivity rates) with spacing practices by district, whereas the mechanism of COVID-19 transmission would operate at the school or even classroom level. Our analysis of Table#1 data indicates significant heterogeneity over the months of the study. Incidence Rate Ratios were lower in the 6 ft districts than in the 3 ft districts for 7 of the first 8 weeks of the study period. Had the study been limited to 8 weeks, (ending before Thanksgiving and year-end holidays) the difference favoring 6 ft would have been statistically significant (binomial test =0.03).

The 3 ft and 6ft comparison groups were based upon school policy statements from publicly available sources; arguably the best source of information for a retrospective study design. However, in our New Jersey experience schools with in-person or hybrid teaching during the same months, typically had actual classroom attendance levels far below 25-50% of normal occupancy (e.g., 1 - 9 students present). Hence, for classrooms normally designed for 20 students, this decreased occupancy automatically produced > 6ft distancing. Also, since many districts used staggered schedules, the study's 80% cut point for "high" versus "low" enrollment likely mischaracterizes classroom density estimates. Accordingly, we are concerned that the inherent limitations of this retrospective study present significant potential for misclassification bias; which favors the null hypothesis (a type II error).[2]

Finally, the analysis did not address ventilation rates, an important control strategy for indoor respiratory transmission of microbes. Smaller respiratory droplets and particles can remain suspended in air for hours[3, 4, 5, 6, 7] resulting in virus transmission if ventilation dilution and/or filtration are inadequate.[8] Classroom ventilation design guidelines factor both occupant density and area (square footage).[9,10] Hence, classrooms with more outdoor air dilution relative to the number of occupants will be more effective at interdicting transmission. Because ventilation rates (a confounder for spacing distance) could not be evaluated, the authors' conclusions that the lack of a significant difference in COVID-19 positivity rate was due to distancing alone, is misleading.

In conclusion, we recognize the importance of safely reopening schools as quickly as possible and recommend that school districts continue to factor the interplay between actual ventilation rates and occupant density when planning reopening.[10] For schools with non-existent, older or poorly functioning HVAC equipment, social distancing > 6 feet may remain part of a layered strategy to reduce COVID-19 transmission risk for students and staff.

None of the authors has potential conflicts of interest

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