Is 3 feet of physical distancing enough?

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Dear Editor:

Van den Berg et al. (2021) conducted a study of students and staff to compare rates of Severe Acute Respiratory Syndrome Coronvavirus-2 (SARS-CoV-2) transmission between those exposed to a 3ft vs 6ft physical distancing policy in classrooms [1]. Their study has catalyzed a rich scientific discussion about physical distancing measures in schools [2]. While the authors correctly indicated that there were no statistical differences between their comparisons, we argue that the point estimate and 95% confidence interval (CI) for a subset of their results do not wholly support their conclusion of 'no association' between distancing measures and SARS-CoV-2 incidence.

We focus on van den Berg et al.'s results examining SARS-CoV-2 incidence among students after adjusting for community SARS-CoV-2 incidence and district demographics (incidence rate ratio [IRR]=0.789 [95%CI=0.528-1.179]). **Figure 1** provides a visual depiction of the 95%CI function for this estimate [3]. We observe that the point estimate and majority of the 95%CI lie below the null (IRR=1.0), indicating a 21% reduction in SARS-CoV-2 incidence for 6ft vs 3ft of physical distancing, with a minimal portion of the CI exceeding 1.0. The authors concluded that "increasing physical distancing requirements from 3 to 6 feet is not associated with a reduction in SARS-CoV-2 cases among students..." ; however, an association is present (albeit imprecise and statistically insignificant), and the effect size appears to suggest a *benefit* of 6ft over 3ft of physical distancing. Dichotomizing findings in terms of statistical significance discards valuable information regarding the magnitude and importance of the observed effect [4, 5]. Further, as the authors acknowledged, exposure misclassification is likely present given real-world behaviour and imperfect enforcement of physical distancing policies.

We conducted a probabilistic bias analysis to describe the impact of non-differential exposure misclassification on the association between classroom physical distancing policies and SARS-CoV-2 incidence [6]. We generated a hypothetical 2x2 table that resembles the author's observed effect size and relative precision (2x2 cells: $a_{Case}^{6ft} = 88$; $b_{Case}^{3ft} = 35$; $c_{non-case}^{6ft} = 392{,}533$; $d_{non-case}^{3ft} = 123{,}121$). Using Stata's *episensi*, we specified 20,000 replicates and a trapezoidal distribution of bias parameters (sensitivity and specificity: minimum=70%; modes=80 and 90%; maximum=100%) [6]. We observed that non-differential exposure misclassification shifted the point estimate away from the null value (bias-adjusted risk ratio=0.60, 95% simulation interval: 0.12-0.99), and under the specified distribution of bias parameters, could shift the simulation interval's upper bound below 1.0. If present, non-differential misclassification error would underestimate the protective effect of 6ft physical distancing. Although we only consider one form of systematic bias, assume non-differential exposure misclassification, and use hypothetical estimates, we hope this analysis demonstrates the impact of these measurement issues, encourages a more cautious interpretation of this study's findings and promotes the use of quantitative bias analysis [7].

Notwithstanding the value of van den Berg et al.'s findings, we respectfully disagree with the authors' conclusion that there is no association between 3ft and 6ft of distance between students and believe a more careful interpretation is warranted. A summary of several studies will be necessary to inform safe physical distancing limits for SARS-Cov-2 transmission in schools.

References

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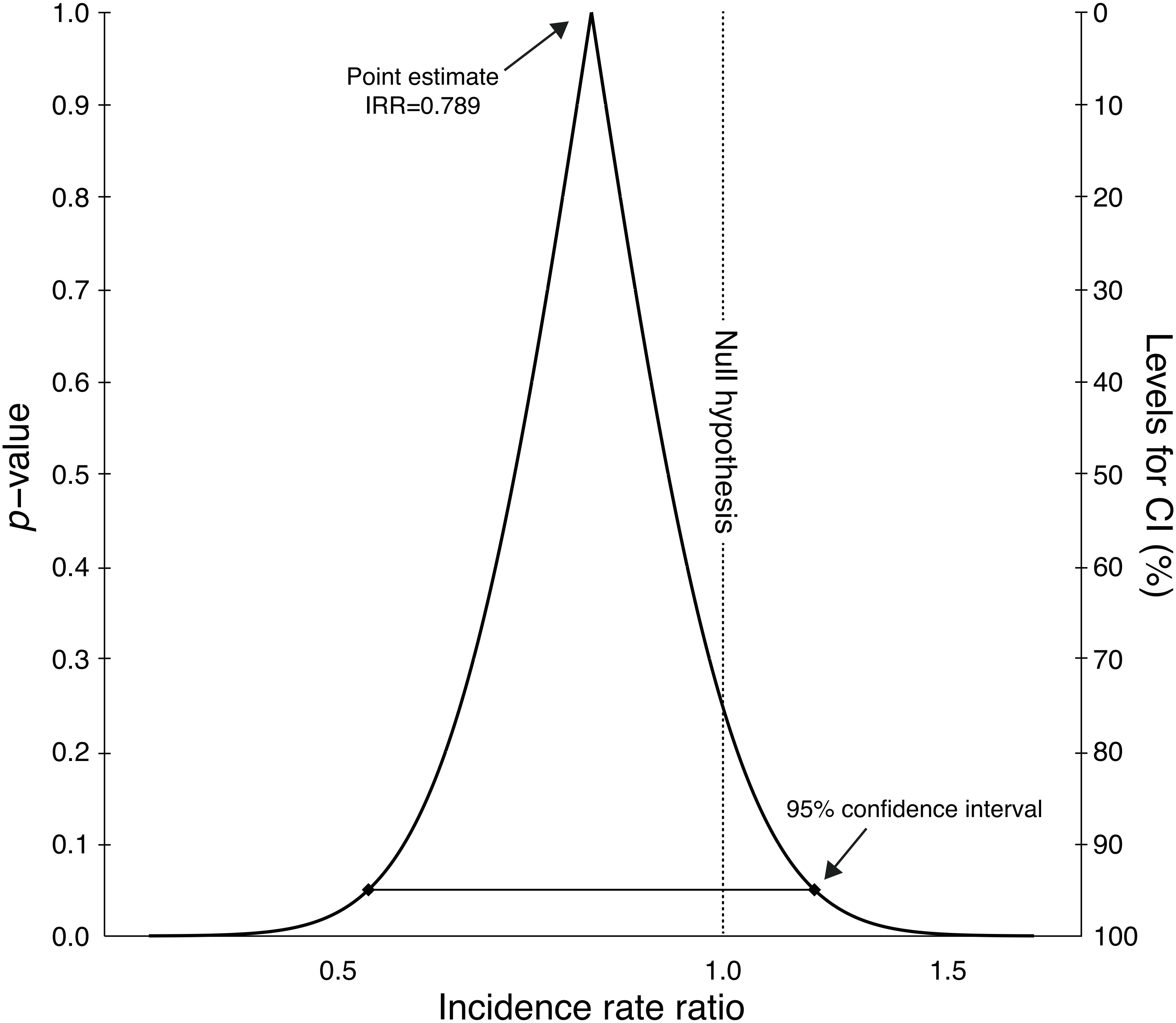
Figure legends

Figure 1 legend: Confidence interval function for the incidence rate ratio of SARS-CoV-2 transmission among students in school districts with ≥6 versus ≥3 feet of physical distancing adjusted for community SARS-CoV-2 incidence and district demographics



1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
p–value
0
10
20
30
40
50
60
70
80
90
100
Levels for CI (%)
Point estimate
IRR=0.789
Null hypothesis
95% confidence interval
0.5
1.0
1.5
Incidence rate ratio