Rapid Reviews COVID-19 •

Review 2: "Estimating Data-Driven COVID-19 Mitigation Strategies for Safe University Reopening"

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RR:C19 Evidence Scale rating by reviewer:

- **Potentially informative.** The main claims made are not strongly justified by the methods and data, but may yield some insight. The results and conclusions of the study may resemble those from the hypothetical ideal study, but there is substantial room for doubt. Decision-makers should consider this evidence only with a thorough understanding of its weaknesses, alongside other evidence and theory. Decision-makers should not consider this actionable, unless the weaknesses are clearly understood and there is other theory and evidence to further support it.

Review:

The manuscript “Estimating data-driven COVID-19 mitigation strategies for safe university reopening” by Yang et al. (<https://doi.org/10.1101/2021.08.13.21261983>) develops an agent-based model (ABM) for simulating the Epidemiological curve of COVID-19 at a US university (Kent State) based on different vaccination rates and Non-pharmaceutical Intervention (NPI) levels. One highlight of the study is the employment of the demographic data by a campus survey, which includes the age distribution, housing type, role (e.g., students, faculty/staff), and their number of contacts in a week. The paper concludes that a vaccination rate of 60% is sufficient for reopening the campus. I believe this model can help school officials and state stakeholders to make informed policy recommendations for a reopening plan in the rise of the pandemic.

In the middle of COVID-19, there has been a plethora of epidemic modelling work. Many of the epidemic models, including the SEIR model and its extensions, are towards the large geographical scale, such as a city or a town. These attempts may not well guide the reopening plan of schools, which is known as the micro-scale. Thus, the ABM model proposed in this manuscript can potentially contribute to revealing important health policy implications to safely reopen schools.

While this paper is a worthwhile attempt, I do believe it needs to be more polished with practical clinical data. For example, (1) the initialization of the ABM is based on a full set of randomization—the 26k agents are randomly assigned a role and their housing type, which will largely deviate from reality. Also, the visit locations and the

contacts are both randomized, which makes the model a little bit superficial. (2) How the three I states are determined among the three sub I states are unclear. Also, in Figure 2b, the I_A is linked to R without going through the three sub I states. Does it mean these are cases without symptoms? Also, why 50% of contacts of a confirmed case can be identified? Supporting evidence/literature is needed. (3) The paper has mixed use of immunity and vaccination. Getting vaccination does not mean being immune to the virus. So terminology like “immune level” in figures, tables, and throughout the article needs to be changed. (4) The emerging Delta variant may completely change the disease landscape, including the effectiveness of the vaccine. How to incorporate this evolving situation in the model will provide practical evidence for future interventions. (5) Lastly, providing a web link to the model or the data can help the reviewers to further assess the validity of the study.

Overall, I believe this model can be further improved, such as incorporating field data, justifying model initialization, and further considering the Delta variant. When these improvements are made, the proposed model and the simulation results will provide a new computational perspective and scientific evidence to influence public policy.