Review 1 "Model-Based Assessment of SARS-CoV-2 Delta Variant Transmission Dynamics Within Partially Vaccinated K-12 School Populations"

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**RR:C19 Evidence Scale rating by reviewer:**

- **Reliable.** The main study claims are generally justified by its methods and data. The results and conclusions are likely to be similar to the hypothetical ideal study. There are some minor caveats or limitations, but they would/do not change the major claims of the study. The study provides sufficient strength of evidence on its own that its main claims should be considered actionable, with some room for future revision.

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**Review:**

This article developed an individual-based transmission model to simulate transmission of the Delta variant of SARS-Cov-2 among a synthetic population, representative of school-aged population and their adult family members in Bay area cities. The model separated schools into elementary, middle and high schools, and assigned individual grades and classroom within each school, based on age. All individuals interacted with all other individuals in one of six ways, according to hierarchy of highest shared membership: household > classroom or workplace > grade > school > community.

Stochastic simulation used to simulate SARS-CoV-2 transmission. At each time increment (one day), each individual was associated with an epidemiological state. Transmission was implemented probabilistically for contacts between susceptible and infectious individuals in the asymptomatic or symptomatic and non-hospitalized states. Movement of an individual on one day from a susceptible to exposed class was determined by a Bernoulli random draw with probability of success given by the infection rate and contact relations. The model included various contact relationship through the contact rate functions of different cohort individuals. Effects of various non-pharmaceutical interventions (NPIs) were also considered in the model through variances in model coefficients.

This study evaluated the additional infections in students and teachers/staff resulting over a 128-day semester from in-school compared to remote instruction when various NPIs implemented in schools, across various community-wide vaccination coverages and student and teacher/staff vaccination coverages. This study also quantified the added benefit of universal masking over masking among unvaccinated students and
teachers, across varying levels of vaccine effectiveness, and compared results between Delta and Alpha variant circulation.

Findings in this study demonstrated that schools are not inherently low risk under Delta variant circulation, yet can be made so with high community vaccination coverages and universal masking. This conclusion is in general supported by the proposed model.