Reopening Schools Safely:
New Evidence on Mitigating COVID-19 Spread

COVID-19 has profoundly affected educational institutions across the country and around the world. Since spring 2020, most U.S. school buildings have been closed, dramatically impacting learning for students.[1, 2] Schools and districts are considering public health and educational factors such as potential learning loss when planning for the 2020–2021 school year. Research conducted by Regional Educational Laboratory (REL) Mid-Atlantic suggests that **reducing the number of students** in classrooms and other shared school spaces, in addition to implementing precautions (such as physical distancing, some wearing of masks, and promoting good ventilation), allows for a safer reopening.

Research to date suggests most children are at lower risk of contracting COVID-19, but they still might spread it to adults who are at greater risk.

Initial studies suggest that children are about half as likely as adults to contract the virus when exposed and generally do not experience severe symptoms if they do test positive.[3,4,5,6] Children may be somewhat less likely than adults to transmit the virus to others but how much less is unclear.[7,8,9] Gathering large numbers of students in schools may lead to increased transmissions to the adults with whom school-aged children interact and the community at large.[3,10]

Research also indicates physical distancing, masks, and increased ventilation could help reduce COVID-19 spread in schools—if they can be implemented effectively.

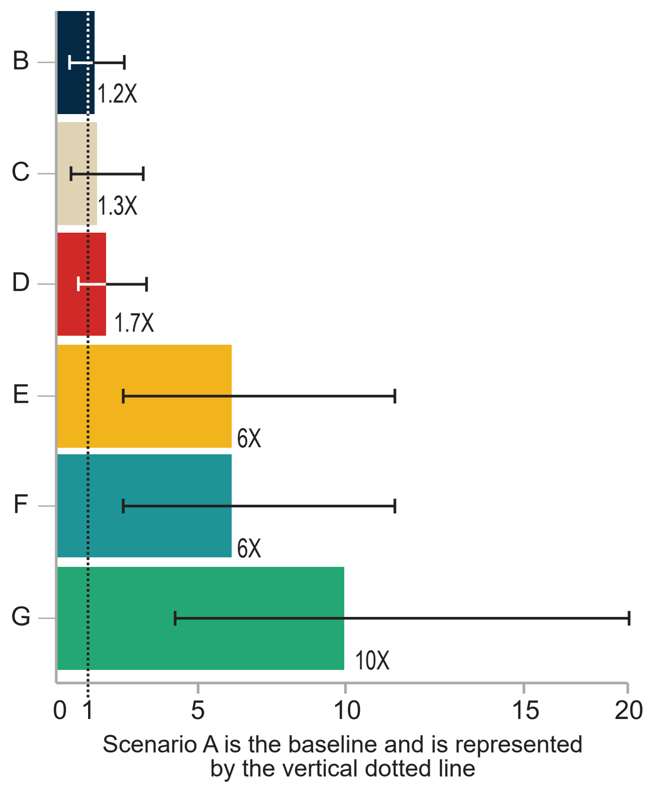
A recent combined analysis of 172 observational studies on COVID-19 and other similar coronaviruses across 16 countries shows that physical distancing has been associated with a large reduction in the likelihood of infection.[11] Similarly, masks can substantially reduce infection spread. A recent study also concluded that increased ventilation can reduce the spread of COVID-19. [14] But ensuring that children comply with mask-wearing and distancing requirements might be quite difficult, particularly in the early grades.[17,18]

Computational model predictions: Scenarios for school reopening

Informed by emerging evidence about COVID-19, the REL simulated the effects of six scenarios, each involving different infection mitigation strategies, using a computational model that examines interactions among individuals on buses and in schools to compare how long it would take an average school to reach five student or staff infections as compared to a business-as-usual model where schools took no precautions. We also predicted the percentage of transmission that would occur within or outside of school settings under the varying scenarios. **Figure 1 shows the five infections, compared to a school operating business-as-usual without changes or precautions.** For example, the model predicts that it could take a school implementing Scenario G 10 times longer to reach five infections than a school that operates under business-as-usual conditions.

Dividing students into smaller groups, with part-time in-person attendance (20 to 40 percent of school days) and precautions for those attending, is likely to slow infection spread the most. These approaches (shown in Scenarios E, F, and G) allow schools to remain open (that is, have fewer than five infections) for **6 to 10 times as long** as if they tried to operate with business as usual. Models where students attend school daily with precautions extend the amount of time by a much smaller degree—only 1.2 to 1.7 times longer—relative to business as usual. Results for middle and elementary schools are similar to those for high schools (although Scenarios C and D are not relevant for elementary schools).

Figure 1: The relative time from school start to the fifth COVID-19 infection among high school students and staff.*



Scenarios

A: Baseline- Business-as-usual (not shown)

B: All students attend daily with precautions (students wear masks on buses, teachers/staff wear masks inside and outside the classroom physical distancing, lunches eaten in classrooms, limited student interaction outside of class)

C: All students attend daily with precautions from Scenario B and block scheduling (longer class periods for fewer subjects per day)

D: All students attend daily with precautions from Scenario B and students stay in the same classroom all day (teachers rotate instead of students)

E: Rotating two days per week: half of students attend each day (Mon–Thurs) with precautions from Scenario B, remote instruction for all students once per week (Fri)

F: Rotating four-day week: half of students attend each week (Mon–Thurs) with precautions from Scenario B, remote instruction for all students once per week (Fri)

G: Rotating one day per week: 20 percent of students attend each day (Mon–Fri) with precautions from Scenario B, remote instruction for remaining 80 percent of students

Part-time attendance with 20 to 40 percent of students in school buildings each day with precautions can dramatically shrink the school's role in spreading infections.

In the scenarios with students split into different groups attending part time, 83 to 98 percent of infections in the school population (students and staff) occur in the outside community—and would have occurred even if the school building was closed entirely. In communities where local infection rates are low enough to permit any reopening, this implies that part-time attendance in small groups with precautions can allow schools to reopen without substantially increasing infection spread in the community.

***The graph shows relative time factors** (length of time to reach five infections compared to the baseline) instead of number of days to infection to encourage stakeholders to focus on the comparison of scenarios as opposed to absolute values for number of days until the fifth infection, which are likely to vary. The bars around the average show the range of expected outcomes (5th percentile to 95th percentile) for each scenario. The results for any single school could vary widely due to systematic factors and random chance. The rate of infection spread might be slowed if students are able to consistently wear masks and maintain physical distance all day long, but even schools that implement stringent safeguards can be unlucky. Additionally, larger schools might close sooner due to larger numbers of students mixing in school settings.

Endnotes:

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