

Science Note: Onsite Learning During the COVID-19 Pandemic

In response to the COVID-19 pandemic, many K-12 schools in Missouri have implemented “distanced” learning (i.e. classes conducted remotely through the internet) to reduce community transmission of the SARS-CoV-2 virus. As of October 20th, approximately 107,000 K-12 students in the state (out of 880,000 total) attend schools that have implemented distanced learning exclusively for the time being, with the remainder of students onsite on at least a partial basis.¹ Evidence from past school closings, however, indicates that distanced learning may introduce tradeoffs between public health and other socioeconomic outcomes. In particular, distanced learning may reduce the quality of education provided, place additional burden on teachers and families, and exacerbate existing inequalities.

Science Highlights

- **Distanced learning has been shown to decrease community spread of airborne pathogens**, including the SARS-CoV-2 virus responsible for the COVID-19 pandemic.
- However, **distanced learning also presents socioeconomic tradeoffs**, including learning loss, increased burden on teachers and families, and exacerbation of existing inequalities.
- **No single criterion indicates when onsite learning is appropriate**, so many contextual factors must be considered.

What are the health risks associated with onsite schooling during the COVID-19 pandemic?

SARS-CoV-2 is a highly infectious pathogen that is easily transmitted in crowded indoor settings. Evidence from previous outbreaks of airborne pathogens, namely SARS, MERS, and influenza, indicates that school closures “flatten” the infection curve by both delaying and reducing the size of the community infection peak.^{2,3} Distanced learning, where students attend school remotely using digital technology, reduces contacts in a similar manner to school closings, so there is reason to believe that distanced learning is an effective public health measure.

The Centers for Disease Control (CDC) has prioritized safely returning to onsite learning as quickly as possible and has released guidelines to help state and local educational institutions decide when and how to resume onsite learning.⁴ They note that no single indicator can be used to assess whether the tradeoffs surrounding onsite learning are worthwhile in a given community, so a variety of contextual factors must be considered. Should schools decide to resume onsite learning, proactive and reactive public health measures, such as use of masks, physical distancing, and contact tracing, should be implemented and adhered to as thoroughly as possible. The Missouri Departments of Health & Senior Services and Elementary & Secondary Education have integrated CDC guidance into their own document advising schools on best reopening practices during COVID-19.⁵ Several publicly available dashboards track the incidence of COVID-19 cases in Missouri schools and school-age children, so decisionmakers can integrate this data into their strategies.^{1,6}

The health risks associated with onsite learning increase as the number of cases in the community rises, as summarized in the table created by the CDC below. Several publicly available dashboards track the incidence of COVID-19 cases in Missouri schools and school-aged children, so decisionmakers can integrate this data into their strategies.^{1,6} These guidelines also note that proactive and reactive public health measures, such as use of masks, physical distancing, and contact tracing, should be implemented and adhered to to mitigate the risk of school-related SARS-CoV-2 transmission.

Indicators	Lowest risk of transmission in schools	Lower risk of transmission in schools	Moderate risk of transmission in schools	Higher risk of transmission in schools	Highest risk of transmission in schools
Core Indicators					
Number of new cases per 100,000 persons within the last 14 days*	<5	5 to <20	20 to <50	50 to ≤ 200	>200
Percentage of RT-PCR tests that are positive during the last 14 days**	<3%	3% to <5%	5% to <8%	8% to ≤ 10%	>10%
Ability of the school to implement 5 key mitigation strategies: <ul style="list-style-type: none"> • Consistent and correct use of masks • Social distancing to the largest extent possible • Hand hygiene and respiratory etiquette • Cleaning and disinfection • Contact tracing in collaboration with local health department Schools should adopt the additional mitigation measures outlined below to the extent possible, practical and feasible.	Implemented all 5 strategies correctly and consistently	Implemented all 5 strategies correctly but inconsistently	Implemented 3-4 strategies correctly and consistently	Implemented 1-2 strategies correctly and consistently	Implemented no strategies

CDC indicators and thresholds for risk of introduction and transmission of SARS-CoV-2 in schools.

Can school-aged children get infected with SARS-CoV-2?

A major concern of onsite learning is that children may facilitate the spread of SARS-CoV-2. To date, the observed number of COVID-19 cases in school-aged children is lower than would be expected if the virus were uniformly transmitted. Researchers are currently working to understand why this is the case and what this finding means in terms of viral transmission via schools. Currently, direct evidence for decreased susceptibility in children to infection by SARS-CoV-2 is mixed, so it is unclear whether they contract the virus at similar rates to adults after exposure.⁷ However, several studies suggest that children are more likely than older populations to exhibit mild or no symptoms upon contracting the virus.^{8,9} This may mean that fewer cases are being reported in school-aged populations because children are less likely than adults to appear sick, and therefore are not tested for the virus.

Can school-aged children infected with SARS-CoV-2 transmit the virus?

Currently, there is reason to believe that children infected with SARS-CoV-2 are no less infectious than older populations.^{8,9} Taken together, this suggests that student-to-student transmission of SARS-CoV-2 is a low-risk factor associated with onsite learning, but that transmission from students to older family members, faculty, or staff is higher-risk given the increased likelihood of adverse health outcomes in these older populations.

What are the socioeconomic consequences of the COVID-19 pandemic related to disruptions of onsite schooling?

A wide body of research indicates that disruptions in regular schooling have negative effects on educational performance, income, and life expectancy, so there is reason to believe that pandemic-related school closures may have similar impacts on children.¹⁰ Though recent technological advances have made distanced learning possible, there are concerns that distanced learning possesses several drawbacks for teachers, students, and families. Many teachers report an increased teaching burden as a result of serving online and in-person students, especially in hybrid learning models. Because the average salary for Missouri teachers is one of the lowest in the country, this has caused concern for the state's ability to attract and retain teachers.

Educational quality also varies across distanced learning options, and several studies predict that most students will experience months of learning loss compared to a traditional school year. This is particularly important for younger students, whose ability to meet early learning benchmarks is critical for their continued academic success. In addition to teaching and learning changes, reduced access to the wraparound services traditionally provided in school buildings, like free and reduced price lunch, counselors and crisis/abuse reporting, are predicted to impact the food security, mental health, and safety of many Missouri students.

There is particular concern for how distanced learning exacerbates existing inequalities based on income, geography and race. For example, Black, Hispanic and low-income students are the most likely to receive low quality or no virtual instruction, leading to higher predicted learning losses due to distanced learning.¹¹ On the other hand, families with higher income and educational attainment are more likely to have reliable internet access needed for distanced learning, also referred to as the “digital divide”. Higher-income families also have the capability to absorb costs related to increased childcare, and the resources to arrange for additional educational programs like tutoring. Overall, the socioeconomic, racial, and geographic disparities in access to and utilization of both “school-centered” and “parent-centered” resources,¹² are likely to widen existing societal gaps within the education system and beyond.

Scientific Limitations

- Due to its recency, there are few peer-reviewed published studies of the health, educational, and economic impacts of school closures during COVID-19 pandemic (many studies use data from SARS, MERS, and influenza outbreaks).
- Substantial uncertainty remains regarding the susceptibility of children to SARS-CoV-2 and their infectiousness.

Citations and other references

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