Lessons from CDC Studies of COVID-19 in Schools and Implications for Science Education

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National Science Teaching Association
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Presentation Outline

- Summary of the evidence on SARS-CoV-2 transmission in schools
- Summary of the evidence on COVID-19 prevention strategies
- Mental health impact of COVID-19 pandemic on parents and children
- The role of science teachers
The School Fieldwork Section partners with health departments, school districts, and schools to reduce the spread of COVID-19 by:

- Collaborating to learn **lessons and best practices to improve** our response to COVID-19
- **Supporting rapid investigation** in schools
- **Facilitating communication** between schools
- Providing a **national picture** of the COVID-19 response in K-12 schools
**About the Study**

- NYC public schools opened for in-person instruction on September 21, 2020 with substantial preventive measures.
- NYC instituted a monitoring program by conducting PCR testing among a sample of asymptomatic staff and students.
- 288,199 hybrid students and 80,876 adults at the schools during this testing period.

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**Outcomes of close contacts of school cases — October 9–December 18, 2020**

<table>
<thead>
<tr>
<th>Close Contacts</th>
<th>No. of persons (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of close contacts identified with exposure date during October 9–December 18, 2020</td>
<td>36,423</td>
</tr>
<tr>
<td>Close contacts who tested positive for SARS-CoV-2 within 14 days of exposure date</td>
<td>191 (0.5%)</td>
</tr>
<tr>
<td>Close contacts for whom direction of infection was known</td>
<td>132 (69%)</td>
</tr>
<tr>
<td>Staff to staff</td>
<td>67 (51%)</td>
</tr>
<tr>
<td>Staff to student</td>
<td>36 (27%)</td>
</tr>
<tr>
<td>Student to staff</td>
<td>18 (14%)</td>
</tr>
<tr>
<td>Student to student</td>
<td>11 (8%)</td>
</tr>
</tbody>
</table>

https://pediatrics.aappublications.org/content/early/2021/03/05/peds.2021-050605
SARS-CoV-2 Infections Among Students and Staff in New York City Public Schools

Overall SARS-CoV-2 positivity by school type, stratified by staff and students — New York City, October–December 2020

<table>
<thead>
<tr>
<th>School type</th>
<th>No. of staff tested positive for COVID-19 (percent positive)</th>
<th>No. of students tested positive for COVID-19 (percent positive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary school (6-12)</td>
<td>13 (0.31%)</td>
<td>5 (0.23%)</td>
</tr>
<tr>
<td>High school (9-12)</td>
<td>52 (0.27%)</td>
<td>11 (0.16%)</td>
</tr>
<tr>
<td>Elementary (3K-5)</td>
<td>351 (0.44%)</td>
<td>335 (0.54%)</td>
</tr>
<tr>
<td>Early childhood (3K-2)</td>
<td>5 (0.36%)</td>
<td>4 (0.45%)</td>
</tr>
<tr>
<td>Junior High-Intermediate-Middle (6-8)</td>
<td>48 (0.32%)</td>
<td>39 (0.34%)</td>
</tr>
<tr>
<td>K–8</td>
<td>76 (0.46%)</td>
<td>51 (0.43%)</td>
</tr>
<tr>
<td>K–12</td>
<td>1 (0.15%)</td>
<td>0 (0.00%)</td>
</tr>
</tbody>
</table>

Conclusions

- Staff may have an elevated risk of SARS-CoV-2 infection relative to the community, but this risk is not clearly attributable to transmission in schools.
- In-person learning in NYC public schools was not associated with increased prevalence and incidence overall compared with the general community.
- Strict protocols for preventing, diagnosing, and managing school-associated cases might have contributed, but further studies are needed to understand which measures are most important to reduce transmission among students and staff.

https://pediatrics.aappublications.org/content/early/2021/03/05/peds.2021-050605
SARS-CoV-2 in Primary and Secondary School Settings During the First Semester of School Reopening — Florida, August–December 2020

Weekly school-related SARS-CoV-2 cases reported among students, as a proportion of overall cases in children aged 5–17 years and in the general population

Aug. 10–Dec. 21, 34,959 school-related cases

Incidence of 1,280 per 100,000 registered students

39.4% of cases in 5-17 age group classified as school-related

25,094 student cases

9,630 staff cases

https://www.cdc.gov/mmwr/volumes/70/wr/mm7012e2.htm?s_cid=mm7012e2_w
SARS-CoV-2 Secondary Transmission in K-12 Schools Implementing Prevention Strategies — Saint Louis County and City of Springfield, Missouri

About the Study

- Investigation of occurrences of secondary SARS-CoV-2 transmission in K-12 schools in the city of Springfield and Saint Louis County in MO
- Examined implementation of prevention measures in schools
- Springfield implemented modified quarantine policy allowing students who met certain requirements to continue in-person learning

Prevention Measures Implemented in Schools (n=55)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face mask mandate</td>
<td>100%</td>
</tr>
<tr>
<td>Desks spaced ≥3 ft apart*</td>
<td>100%</td>
</tr>
<tr>
<td>Handwashing/sanitizing stations in dining areas, restrooms, and classrooms</td>
<td>100%</td>
</tr>
<tr>
<td>Handwashing/sanitizing stations at school entrances</td>
<td>98%</td>
</tr>
<tr>
<td>Modifications to increase ventilation*</td>
<td>98%</td>
</tr>
<tr>
<td>Physical barriers between teachers and students*</td>
<td>98%</td>
</tr>
<tr>
<td>Desks spaced ≥6 ft apart*</td>
<td>27%</td>
</tr>
</tbody>
</table>

*in at least some classrooms

https://www.cdc.gov/mmwr/volumes/70/wr/mm7012e4.htm?s_cid=mm7012e4_w
## School-Associated Close Contacts and SARS-CoV-2 RT-PCR Results

<table>
<thead>
<tr>
<th></th>
<th>Saint Louis County (Regular Quarantine Policy)</th>
<th>City of Springfield (Modified Quarantine Policy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARS-CoV-2 cases</td>
<td>20</td>
<td>36</td>
</tr>
<tr>
<td>Close contacts</td>
<td>115</td>
<td>155</td>
</tr>
<tr>
<td>Quarantined at home</td>
<td>115</td>
<td>113</td>
</tr>
<tr>
<td>Continued in-person learning</td>
<td>N/A</td>
<td>42</td>
</tr>
<tr>
<td>Interviewed</td>
<td>64</td>
<td>92</td>
</tr>
<tr>
<td>Tested</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>Positive</td>
<td>0</td>
<td>2**</td>
</tr>
</tbody>
</table>

**Cases occurred among close contacts who were quarantined at home**

### Conclusion

Until additional data are available, K–12 schools should continue implementing CDC-recommended prevention measures and follow CDC isolation and quarantine guidance to minimize secondary transmission in school.

[https://www.cdc.gov/mmwr/volumes/70/wr/mm7012e4.htm?s_cid=mm7012e4_w](https://www.cdc.gov/mmwr/volumes/70/wr/mm7012e4.htm?s_cid=mm7012e4_w)
Low SARS-CoV-2 Transmission in Elementary Schools — Utah

51 Index Cases (40 students, 11 staff) → 1,041 associated school contacts → 735 (70.6%) of school contacts were tested

SARS-CoV-2 Test Results of Close Contacts

Positive 2%
Negative 98%

Conclusion

When students and staff wear masks and use other prevention strategies, transmission of SARS-CoV-2 is low, even when students were unable to stay 6 or more feet apart in classrooms.

https://www.cdc.gov/mmwr/volumes/70/wr/mm7012e3.htm?s_cid=mm7012e3_w
Minimal SARS-CoV-2 Transmission Following Implementation of a Comprehensive Mitigation Strategy at a Boarding School in New Jersey

<table>
<thead>
<tr>
<th>SARS-CoV-2 Testing Results and Tracing of Cases and Contacts in a Private Boarding School—New Jersey, August 20-November 27, 2020</th>
<th>Faculty/Staff (n=405)</th>
<th>Students (n=775)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimens tested</td>
<td>8,955</td>
<td>12,494</td>
</tr>
<tr>
<td>RT-PCR-positive tests among patients</td>
<td>19 (4.7%)†</td>
<td>8 (1.0%)</td>
</tr>
<tr>
<td>Cases linked to on-campus transmission</td>
<td>0</td>
<td>2§</td>
</tr>
<tr>
<td>Contacts identified and quarantined</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>Contacts tested positive</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

†Two faculty/staff tested positive and linked to off-campus cases and are included for completeness of results

§ No plausible off-campus source could be identified

Comprehensive mitigation strategies included:

- Pre-arrival protocols
- Classroom safety measures, including universal masking
- Physical distancing
- Testing and screening protocols
- Innovative contact tracing tools
- Robust quarantine measures
- Compliance protocols

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a2.htm?s_cid=mm7011a2_w
Transmission of SARS-CoV-2 among persons associated with a high school football team, by date of onset — Florida, September 2020

Transmission of SARS-CoV-2 among persons associated with a high school football team, by date of onset — Florida, September 2020

Recommended Strategies to Prevent Transmission:

- Implement frequent cleaning and disinfection of routinely touched surfaces
- Ensure adequate ventilation in enclosed areas
- Enforce routine mask use during practice

In the 14 days preceding September 17, the team held afternoon practices Monday through Thursday. Practices included exercise drills, scrimmages, play run-throughs, and hydration breaks conducted outdoors, and film reviews and strength conditioning conducted indoors.

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a3.htm?s_cid=mm7011a3_w
Outbreak Associated with High School Wrestling Tournaments in Florida – December 2020

**December 4**
- Tournament #1
  - Host School
  - 5 additional schools

**December 5**
- Tournament #2
  - Host school
  - 4 different schools

**December 7**
- Authorities notified that one individual tested positive

**December 8-9**
- 13 wrestlers from host school test positive

**Tournament Totals**
- 130 total attendees
- 54 tested
- **38 cases**
- 30% attack rate

- **62 Household Contacts**
  - 30 tested
  - 18 cases
  - 30% attack rate

- **64 Non-Competing Teammates**
  - 24 tested
  - 13 cases
  - 20% attack rate

- **152 Other Athletics Members**
  - 11 tested
  - 0 cases
  - 0% attack rate

- **168 Classmates & Teachers**
  - 30 tested
  - 10 cases
  - 6% attack rate

[https://www.cdc.gov/mmwr/volumes/70/wr/mm7004e4.htm?s_cid=mm7004e4_w](https://www.cdc.gov/mmwr/volumes/70/wr/mm7004e4.htm?s_cid=mm7004e4_w)
Summary: What We’ve Learned about Transmission in Schools

• K-12 schools that adhered to prevention measures have been able to reopen safely.
• Frequent testing combined with case investigation, contact tracing, isolation, and quarantine protocols is an important strategy for maintaining or returning to in-person learning.
• Layering prevention measures is most effective.
  – Combine testing with universal and correctly worn masks, physical distancing, reducing mixing between classrooms, hand hygiene, classroom cleaning and ventilation, and limiting in-person extracurricular activities.
  – Teachers can implement and model prevention strategies.
  – Teachers should get a SARS-CoV-2 vaccine as soon as they can.
• In-person learning should be prioritized over extracurricular activities.
• With these strategies in place, school transmission is low, even with high community transmission levels.

Which of the following prevention strategies are you using in your classroom?

a) Everyone wears masks correctly
b) Students maintain proper distance
c) Teachers maintain proper distance
d) Windows open
e) Doors open
f) Other ways to increase ventilation
g) Hand hygiene encouraged
h) Teachers are getting vaccinated
Mode of School Instruction and Child and Parent Well-being During the COVID-19 Pandemic

**Child Experiences**
- Change in physical activity
- Change in spending time outside
- Change in spending time with friends in-person
- Change in spending time with friends virtually

**Child Well-Being**
- Change in physical health
- Change in mental/emotional health
- Depression
- Anxiety
- Psychological stress

**Parent Experiences**
- Loss of work
- Concerns about job stability
- Childcare challenges
- Conflict between doing work for job and providing childcare
- Increased substance use

**Parent Well-Being**
- Emotional distress
- Difficulty managing emotions
- Difficulty sleeping or insomnia

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a1.htm?s_cid=mm7011a1_w
Mode of School Instruction and Child and Parent Well-being During the COVID-19 Pandemic

Prevalence of Change in Children's Experiences and Well-being

<table>
<thead>
<tr>
<th>Measure</th>
<th>Virtual</th>
<th>In-Person</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease in Physical Activity</td>
<td>62.9%</td>
<td>30.3%</td>
<td>52.1%</td>
</tr>
<tr>
<td>Decrease in Spending Time Outside</td>
<td>58.0%</td>
<td>27.4%</td>
<td>42.4%</td>
</tr>
<tr>
<td>Decrease in Spending Time w/ Friends, In-person</td>
<td>86.2%</td>
<td>69.5%</td>
<td>84.1%</td>
</tr>
<tr>
<td>Decrease in Spending Time w/ Friends, Virtually</td>
<td>24.3%</td>
<td>12.6%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Decrease in Mental/Emotional Health</td>
<td>24.9%</td>
<td>15.9%</td>
<td>24.7%</td>
</tr>
</tbody>
</table>

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a1.htm?s_cid=mm7011a1_w
### Mode of School Instruction and Child and Parent Well-being During the COVID-19 Pandemic

#### Prevalence of Change in Parents’ Experiences and Well-being

<table>
<thead>
<tr>
<th>Measure</th>
<th>Virtual Only</th>
<th>In-person</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Work</td>
<td>42.7%</td>
<td>30.6%</td>
<td>40.1%</td>
</tr>
<tr>
<td>Concerns About Job Stability</td>
<td>26.6%</td>
<td>15.2%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Childcare Challenges</td>
<td>13.5%</td>
<td>6.8%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Conflict Between Doing Work for Job and Providing Childcare</td>
<td>14.6%</td>
<td>8.3%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Emotional Distress</td>
<td>54.0%</td>
<td>38.4%</td>
<td>42.9%</td>
</tr>
<tr>
<td>Difficulty Sleeping or Insomnia</td>
<td>21.6%</td>
<td>12.9%</td>
<td>16.4%</td>
</tr>
</tbody>
</table>

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a1.htm?s_cid=mm7011a1_w
Mode of School Instruction and Child and Parent Well-being During the COVID-19 Pandemic

**Concerns**
- Decreased physical activity could adversely affect children physically and emotionally
- Isolation can affect mental health
- Chronic stress can affect parents and children physically and mentally

**Potential Solutions**
- Linkage to social and mental health services
- Opportunities to safely engage in physical activity
- Culturally appropriate programming and resources

https://www.cdc.gov/mmwr/volumes/70/wr/mm7011a1.htm?s_cid=mm7011a1_w
How Can Science Teachers Help?

- **Emotional Support:** Teachers play an important role in helping children and youth make sense of what they have heard about COVID-19.
  - Some students may have experienced loss of a loved one from COVID-19 or other trauma.
  - Students may worry about themselves, their family, and friends getting ill with COVID-19.
  - Encouraging students to share their concerns with trusted adults and linking students to necessary resources for mental health and well-being will be critical for students’ recovery from the trauma of the COVID-19 pandemic.
How Can Science Teachers Help?

- **A Teachable Moment:** COVID-19 can be used as a learning opportunity.
  - Some students may be unaware of the risks of COVID-19 or be misinformed, and teachers are uniquely suited to correct misinformation.
  - Age-appropriate COVID-19 lessons can be incorporated into curricula.
  - Introduce students to careers in health sciences.
  - Science teachers can impact their colleagues, including other teachers and administrators.

Claim + Evidence + Reasoning = Explanation
Reducing COVID-19 Risks in Schools

- Funding for school testing
- Implementation and enforcement of prevention measures
- Educate students, provide support for emotional well-being, model behaviors
- Comply with prevention measures
Resources for Science Teachers

- COVID-19 Vaccines for Teachers, School Staff, and Childcare Workers | CDC
- Teachers and Staff Resuming In-Person Learning (cdc.gov)
- How do I set up my classroom? A quick guide for teachers (cdc.gov)
- Modifying School Spaces during Mealtimes to Prevent the Spread of COVID-19
- Cleaning and Disinfecting Your Facility | CDC
- Resources for Teachers and Students (cdc.gov)
- Mental Health and Coping During COVID-19 | CDC
Question 2

Have you taught about COVID-19 in your classes this year?

a) Yes
b) No
For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.