

Summary of Evidence Related to Schools During the COVID-19 Pandemic

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COVID-19 Literature Report Team:

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Most countries world-wide implemented localized or national school closures in response to the COVID-19 pandemic, with estimates of >65% of enrolled children globally affected by school closures.¹ Since the early pandemic, schools in many settings around the world have fully or partially re-opened for in-person instruction, while in other settings schools have re-opened exclusively using online learning.

This document is a brief summary of the models and implementation approaches to re-opening schools, evidence related to the infection and transmission risk among school-age children, and the role of schools in driving transmission in the community. This is not a comprehensive review of the models used in all countries that have re-opened schools. Our systematic search of the published and pre-print literature yielded some articles that address this topic directly, but this summary also relies heavily on news articles and “grey literature” sources. **It includes news articles, manuscripts published in peer-reviewed journals or on pre-print servers, and other resources identified through October 19, 2020. References that appeared in the daily COVID-19 Literature Report (Lit Rep) are marked with an asterisk*, and the summary is shown in the annotated bibliography below.**

Executive Summary of Models of School Re-Opening Globally

- Many countries globally began re-opening schools for in-person instruction starting in April and May 2020 following closures in response to the COVID-19 pandemic. In most settings where schools were re-opened, levels of community transmission were low at the time of re-opening. While subsequent outbreaks occurred in some schools, there was little evidence that schools were main drivers of transmission.
- In many settings, the initial phase of school re-opening was conducted with significant modifications to the normal school model, including providing in-person instruction for only certain grades (usually younger), reduced class sizes, and alternating or staggered schedules.
- Beginning in August and September, many countries shifted to class sizes and schedules that were similar to pre-pandemic models, although many instituted measures to reduce the risk of transmission, including establishing cohorts of students that don't mix, use of face masks, staggered start times to reduce the volume of students in hallways, and full or partial closure of schools in response to a case in the school.
- A small number of well documented outbreaks of SARS-CoV-2 in schools and overnight camps have demonstrated the potential for widespread transmission among school-age children, but successful examples of the application of coordinated control measures in schools and other large gatherings of children without widespread transmission indicates that it may be possible to reduce the risk of

school-based transmission, particularly when rates of SARS-CoV-2 infection are relatively low in the community.

- In the United States (US), there is considerable variability between states and districts in approaches to in-person instruction. As of October 2020, in some states, nearly all students are participating exclusively in online or remote education. In other states, students have returned to in-person learning, with models ranging from fully in-person learning with normal class sizes to hybrid models with a mix of in-person and online or remote learning.
- Data regarding the number of cases of SARS-CoV-2 infection and COVID-19 disease linked to schools in the US is not collected and reported systematically, with variability from state-to-state in terms of requirements to report cases associated with schools. A number of dashboards are collecting available data about cases linked to schools.

Considerations for Closing and Re-opening Schools

- More evidence is emerging about the susceptibility of school-age children to SARS-CoV-2 infection,² their infectiousness, their role in community transmission, and the impact of school closures and re-openings on transmission.^{3-6*} Since the release of the initial version of this summary in early July 2020, more studies have shown that widespread transmission can occur among school-age children,^{7,8*} but that there is very little evidence, at least in the context of relatively low community transmission, that schools have been a driver of transmission. Debates are ongoing about how to best balance the potential benefit of reducing SARS-CoV-2 transmission, by closing schools or significantly modifying the schedule of in-person learning, against the very real consequences of such measures on student learning, indirect harms to students (e.g., lack of access to school-based feeding programs), and the considerable burden this places on parents and caregivers, particularly those who need to simultaneously work. The burden of these indirect effects is likely to fall disproportionately on lower income families and people of color. This summary report does not systematically review these issues, but a sample of commentaries related to this topic is included.
- A small number of countries in regions with some level of community transmission of SARS-CoV-2 never imposed school closures. Sweden is notable among countries that did not close all schools, although Sweden did close schools for secondary grade students between March 18 and June 4, 2020.⁹ Starting in late April and May, many countries around the world started re-opening schools, many of which also sustained limits on other mobility and closures of many businesses after schools were re-opened. Since the initial re-opening, which often occurred for subsets of students or with modified schedules, schools have fully reopened for all students in many settings. While there have been examples of large-scale school closures in response to cases arising in schools soon after re-opening, particularly when school re-opening coincided with widespread relaxation of mobility restrictions and business closures (*Israel, parts of the United States*), many countries have been able to keep the large majority of schools open, even as cases of COVID-19 have increased in the community (*Germany, France, Norway, Belgium, Scotland, South Korea*).

Summary of School Re-opening Models by Country

Country	Current Status	Date of closing	Date of re-opening	Younger students only	Older students only	All Ages	Max class size	Alternate shifts	Alternate days	Facemasks required	Reduced class size	Physical distancing	Increased handwashing	Temperature checks	Viral or antibody testing	Contact tracing	Impact on transmission
Belgium	Open	3/13/2020	5/18/2020	•	•	Y	?	N	N	Teachers, children over 12	?	?	?	?	?	?	Unknown, but teens make up biggest group of new infections as of 9/21
Denmark	Open	3/16/2020	4/15/2020	•	•	Y	?	N	N	N	?	N	Y	N	?	?	No significant increase in the growth rate of COVID-19 cases ⁴
France	Open	3/3/2020 – 3/16/2020	5/11/2020	•	•	Y	?	N	N	Teachers, children over 11	N	N	?	N	?	?	Unknown
Germany	Open	3/3/2020 – 3/18/2020	5/4/2020	•	•	Y	?	N	N	Y/N (in hallways and other spaces, but not in classrooms)	N	N	?	N	Y	Y	Increased transmission among students, but not school staff. ⁴
Greece	Open	3/11/2020	6/1/2020	•	•	Y	27	N	N	Y/N (in classrooms but not outdoors)	Y	Y/N (documented challenges in implementation)	?	?	?	?	Unknown
Israel	Closed (Sep. 17)	3/12/2020	5/3/2020	•	•	•	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Outbreaks continue as some communities opening schools illegally
Japan	Open	3/2/2020	4/24/2020	•	•	Y	?	N	N	Y	N	Y	?	Y	?	?	Unknown
South Korea	Open	3/2/2020	6/8/2020	•	•	Y	33% – 67%	Y	Y	Y	Y	Y	Y	Y	?	Y	Unknown
New Zealand	Open	3/24/2020	5/14/2020	•	•	Y	NA	N	N	N	N	N	N	N	N	Y	Unknown
Norway	Open	3/11/2020	4/20/2020	•	•	Y	N	N	N	N	N	N	Y	N	?	Y	No significant increase in the growth rate of COVID-19 cases ⁴
Scotland	Open	3/23/2020	8/11/2020	•	•	Y	NA	N	N	Y (in some spaces, such as hallways)	N	Y	Y	?	?	?	Recent concern over

																	growing case count
Sweden	Open	never closed	never closed	•	•	Y	NA	N	N	N	N	N	?	N	N	?	Relatively high rate in children suggests there may have been significant spread in schools. ⁹
Switzerland	Open	3/16/2020	5/11/2020	•	•	Y	NA	N	Y	Y (secondary schools only; all teachers)	N	Y	Y	N	?	?	Unknown
Taiwan	Open	winter break extended 2 weeks	2/25/2020	•	•	Y	NA	N	N	Y	N	Y/N	Y	Y	?	?	Unknown
Vietnam	Open	2/28/2020 – 3/31/2020	5/18/2020	•	•	Y	NA	N	N	Y	N	Y	?	Y	N	Y	Unknown
India	Closed	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Kenya	Closed	3/16/2020	10/12/2020	•	•	Y	NA	N	N	Y	N	N	Y	Y	N	?	Unknown
South Africa	Open	3/18/2020	8/24/2020	•	•	Y	Y/N	Y/N	Y/N	Y	N	Y	Y	?	?	?	Unknown
Iran	Open (localized)	2/2020	9/12/2020	•	•	Y/N	?	Y	Y	Y	?	Y	Y	Y	?	?	Unknown
Uruguay	Open (localized)	3/13/2020	6/29/2020	•	•	Y	N	Y	N	Y/N	N	Y	Y	Y	Y	?	Unknown
Brazil	Closed	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Y/N indicates variability in implementation within the country; Current status based on UNESCO COVID-19 Impact on Education tracker (<https://en.unesco.org/covid19/educationresponse>)

Summary of Approaches to Re-Opening Schools and Subsequent Transmission

Since the initial round of school closures, many countries have re-opened schools using a wide range of models. **Characteristics of these models vary between countries**, including the **affected grades** (*younger students only, older students only, or all students*), **schedules** (*reduced in-person time, alternating shifts, alternating days*), and implementation of **transmission control measures** (*class size reductions, physical distancing, face masks, hand washing, temperature checks, and viral or antibody testing*).

- **Affected grades:** Many, but not all, countries initially re-opened schools for only a subset of grades. In most examples, this appears to have been an effort to make more classrooms available to accommodate smaller class sizes. Many countries initially **re-opened schools only for younger children** (*Belgium, Denmark, France, Greece, Norway, Sweden initially*) while others **re-opened only for older students**, based on the belief that older students would be better able to comply with physical distancing and transmission control measures (*Germany*). A smaller number of countries **re-opened schools for all grades** (*France in “green zones”, Israel, Scotland, Sweden currently, Taiwan, and Vietnam*). Most countries that initially re-opened schools for selected grades have transitioned to re-opening schools for all grades.
- **Cohorts or protective capsules:** As many countries and individual jurisdictions and school districts have re-opened schools for in-person learning, often for all grades and with classroom sizes at or near pre-pandemic levels, many have implemented a practice of cohorting – or so called “protective capsules” – in which groups of children are organized together with minimal mixing between groups, often with teachers assigned to specific cohorts (*Germany, Norway*).¹⁰ Cohort sizes can range from a single classroom up to several hundred students. The intention is to limit any potential transmission to within the cohort and to reduce the number of students that would need to be contact traced and quarantined in the event of a case occurring in the group. In some settings, cohorts are assigned staggered arrival and departure times to limit mixing in hallways, and while in transit to and from school (*Norway*).
- **Schedules:** Many countries have **staggered start times, break times, and dismissal times** to increase physical distancing. Some countries have adopted alternative school schedules to accommodate smaller class sizes and to ensure greater distancing. Approaches include having students attending **alternate shifts** (morning and afternoon) (*Germany, South Korea, and Scotland potentially*) or **attending alternate days** (*Belgium, Switzerland*).
- **Transmission control measures:** Most countries have instituted some combination of school-based measures intended to reduce transmission of SARS-CoV-2 among students and staff. These include the use of **face masks** (*with some variability in age requirements: Belgium, France, Germany, Israel, Japan, South Korea, Taiwan, and Vietnam*), **reduced class size** (*typically 10-15 students or approximately 50% capacity: Belgium, Denmark, France, Germany, Greece, South Korea, Norway, Scotland proposed, Switzerland*). Most countries that initially reduced class sizes have subsequently returned to near-normal class sizes. Some countries did not reduce class sizes, many of which are

relying on other measures to reduce transmission such as closing schools with confirmed cases and using desktop dividers to increase physical separation between classroom desks and cafeteria seating without increasing physical distance between students (*Israel, Sweden, Taiwan, and Vietnam*). **Required temperature checks** at school entries have been instituted in some countries (*Japan, South Korea, Taiwan, Vietnam*). **Routine screening for SARS-CoV-2** virus or antibodies is reported on a small scale in Germany as well as in Uruguay. Systematic **contact tracing** in the event that a student or staff tests positive for SARS-CoV-2 or has confirmed COVID-19 is implemented in some countries (*Israel, South Korea, New Zealand, and Germany*).

There remains **limited evidence regarding the impact of school-reopening on SARS-CoV-2 transmission** in the community. Based on the early experience of four European countries (*Denmark, Norway, Sweden, and Germany*), there was some evidence that school closures led to declines in the epidemic growth rates of COVID-19.^{4*} Reopening of schools for all students in countries with low community transmission (*Denmark and Norway*) has not resulted in a significant increase in the growth rate of COVID-19 cases. Return of most students to school in countries with higher levels of community transmission (*Germany*) has been accompanied by increased transmission among students, but not school staff. After re-opening schools in Israel, there have been a number of outbreaks of SARS-CoV-2 in schools that have resulted in those schools being closed.^{8*} In South Korea, schools in some areas were closed again after re-opening in response to surges in the number of COVID-19 cases in the community. As the pandemic has progressed and countries that have re-opened schools have experienced surges in cases, there have been cases that have occurred in schools that have required temporary closures of individual schools, but these have affected a very small proportion of schools (*<0.2% in Belgium and Germany*). In the face of a sharp increase in community cases, Israel has re-imposed many lockdown measures, including closing schools.

Evidence Regarding the Susceptibility of School-age Children to SARS-CoV-2 Infection and their Potential for Transmission

School age children have clearly been shown to be susceptible to SARS-CoV-2 infection and capable of transmitting the virus to other children and adults.^{7,8,11*} While there is evidence that younger children (i.e., younger than 10 years old) may be less susceptible to infection and less likely to transmit to close contacts if they are infected,^{12,13*} a relatively small number of well documented outbreaks involving school-age children demonstrate the potential for widespread transmission among children, particularly when there are limited measures in place to stop transmission.^{7,8,11*} While severe outcomes do occur among school-age children and young people, particularly those with co-morbidities, the incidence of severe outcomes is very low.² An analysis of COVID-19 cases among school-age children found that 1.2% school-aged children with COVID-19 were hospitalized, including 0.1% who required ICU admission.^{14*}

One of the first well documented school **outbreaks of SARS-CoV-2 occurred in Jerusalem, Israel in a secondary school (grades 7-12) in mid-May 2020.**^{8*} After re-opening on May 17 after a two-month closure, a cluster of SARS-CoV-2 infections was identified at the school 10 days later. Overall, 13% of students and 17% of staff had SARS-CoV-2 infection, of whom 43% of students and 76% of staff were symptomatic. The highest prevalence of SARS-CoV-2 was in grades 7-9 (17% to 33%), which corresponded to the grades with the initial index cases, and prevalence was considerably lower in

grades 10-12 (1.6%-4.5%), which had classrooms in a separate wing of the school. Even within the younger grades, cases appeared to be clustered within specific classrooms that were linked to the index cases. Contact tracing of close contacts of cases from the school identified 87 additional cases. An environmental school inspection reported crowded classes (35-38 students per class). While facemasks were initially required, this mandate was removed during a heatwave that occurred within days of the school re-opening. **Important takeaways from this outbreak are that transmission can occur rapidly in crowded classrooms and cohorting of groups of students such that there is limited mixing between cohorts can limit the scope of transmission.** This is potentially relevant to use of so called “protective capsules” to limit transmission in schools.

Another well documented case of **widespread SARS-CoV-2 transmission among school-age children came from an overnight camp in Georgia in July 2020.**^{7*} An outbreak investigation found evidence of widespread transmission of SARS-CoV-2 among children of all ages at the camp. SARS-CoV-2 tests were available for 344 of 597 camp attendees, of whom 260 (76%) were positive. The overall attack proportion was 44%. The attack proportion was 51% among those aged 6–10 years, 44% among those aged 11–17 years, and 33% among those aged 18–21 years. While the camp was adhering to current Executive Orders in place in Georgia allowing camps to operate and put in place most of the components of CDC’s [Suggestions for Youth and Summer Camps](#) to minimize the risk for SARS-CoV-2 introduction and transmission, these measures were insufficient to prevent transmission. The camp involved large groups sleeping in the same cabin and engaging in singing, cheering, and both indoor and outdoor activities. Use of cloth masks was not required among campers. All trainees, staff members, and campers provided documentation of a negative viral SARS-CoV-2 test ≤12 days before arriving.

An adolescent (13 years old) was the index case of an outbreak that occurred during a 3-week family gathering where 11 of 14 attendees developed COVID-19, despite the index case testing negative with a rapid antigen test prior to the gathering.¹⁵ Six other family members who maintained physical distancing by remaining outdoors did not develop COVID-19. This outbreak investigation highlighted the possibility of spread from children and adolescents, evidence of benefit from physical distancing, the lower sensitivity of rapid antigen tests, and the efficiency with which SARS-CoV-2 can spread during gatherings with prolonged close contact.

Evidence Regarding the Effectiveness of Control Measures

While there is clear evidence for the potential for widespread transmission of SARS-CoV-2 in a school environment, there is also direct and indirect evidence that the development of and adherence to protocols to identify cases, isolation of infected individuals and quarantining of close contacts, and maintaining cohorts or capsules with limited mixing between groups can substantially limit the spread of SARS-CoV-2 in the context of group settings with school-age children.

During the 2020 summer camp season, **four overnight camps in Maine with 1,022 attendees from 41 states and international locations implemented a multi-layered prevention and mitigation strategy that was successful in identifying and isolating three asymptomatic persons with SARS-CoV-2 infection and preventing secondary transmission.**^{16*} The four summer camps, which had similar sizes, session duration, and camper and staff member characteristics, opened with uniform non-pharmaceutical interventions, including pre-camp quarantine, pre- and post-arrival testing and symptom screening,

cohorting, and physical distancing between cohorts. In addition, camps required use of face coverings, enhanced hygiene measures, enhanced cleaning and disinfecting, maximal outdoor programming, and early and rapid identification of infection and isolation.

An analysis of SARS-CoV-2 infections linked to **childcare facilities in Rhode Island** identified 52 confirmed and probable childcare-associated cases of COVID-19 in 29 childcare programs in the state (June 1 to July 31) among 666 facilities with a capacity of 18,945 children.^{17*} Of the cases, 30 (58%) were among children (median age = 5 years), and 22 (42%) were among adults (20 teachers and 2 parents, median age = 30 years). **The majority of affected centers (69%) reported only a single case without apparent secondary transmission.** Secondary transmission was suspected in four childcare centers, including one in which an investigation revealed a lack of adherence to the guideline prohibiting switching between groups of children. This provides additional evidence that under adequate control measures, the risk of transmission can be limited among groups of children and adult care providers.

Country-Specific Experience with School Re-Opening

United States

We reviewed guidance documents from a selection of 12 states in the US (AZ, CA, FL, GA, IL, KS, MI, NY, TX, VT, WI, and WA) from different geographical regions to summarize reopening plans across the country. States either developed criteria for re-opening (AZ, CA, IL, KS, MI, VT, and WA), requested schools and districts to submit plans for reopening that require approval (NY, WI), or required schools to re-open but with approval of re-opening plans by the state (FL, GA, and TX). Most states include use of COVID-19 metrics to guide reopening plans (AZ, CA, IL, KS, MI, WA, and VT). All of these states include metrics on community-based transmission, including the number of cases per population size and/or test positivity rates; all but KS also included health system capacity metrics. Additional metrics for testing and/or tracing capacity are also included for IL, MI, VT, and WA. In addition, WA mentions that other health education risks and benefits should be considered but do not provide details on how these may be included. IL specifically mentions “adaptive pauses” as needed to either delay re-opening or pivot to distance learning. Three states (AZ, CA, and WA) use specific COVID-19 metrics as thresholds for reopening; AZ and WA additionally use thresholds to indicate criteria for transitioning between remote/online, hybrid, and in-person learning models. WA additionally uses age- and need-based criteria to prioritize hybrid and in-person learning, and VT also recommended prioritizing those younger than grade 6 for in-person learning. NY notes schools and districts should consider students who have greatest need in their plans and TX permitted fewer in-person days for high school students, specifically.

Reopening plans in FL are largely on a case-by-case evaluation, with state mandates to open at least 5 days a week unless otherwise indicated by FL and local Department of Health. In all other states, symptom screens and/or temperature checks were universally mentioned; however, there was variability in requirements for staff and students. Masks or face covering mandates were common (AZ, CA, IL, KS, MI, TX, VT, WA, and WI), but only recommended in GA and NY. All states include physical distancing and sanitation practices for COVID-19 risk mitigation, additional guidance on transportation (AZ, GA, IL, KS, MI, NY, TX, VT, WA, and WI), athletics (CA, IL, KS, MI, NY, TX, VT, WA, and WI), and meal service (CA, GA, KS, MI, NY, and VT) are also mentioned.

Summary of School Re-opening Plans and Guidance by State

	Guidance doc URLs (date updated)	Reopening status	Instructional model options	Use of metrics to guide decisions	Masks/face coverings	Health screening protocols	Physical distancing	Sanitation	Transportation	Athletics	Food service
AZ	8/6/20	Based on level on community level transmission and quality of risk mitigation plan. Uses adapted CDC indicators of community transmission to guide decision making.	If all 3 benchmarks over 2 weeks are: -Substantial - distance learning -Minimal to moderate - hybrid -No to minimal - in-person	-Substantial: For 2 weeks, case counts >100 per 100,000, test positivity >10%, >10% hospital visits due to COVID-like illness -Moderate: For 2 weeks, case counts 10-100 per 100,000, test positivity 5-10%, 5-10% hospital visits due to COVID-like illness -Mild: For 2 weeks, case counts <10 per 100,000, test positivity <5%, <5% hospital visits due to COVID-like illness	Masks worn throughout the school day	Stay home if sick, monitor for symptoms	✓	✓	✓		
CA	7/17/20 8/3/20	Based on 4 tiers of disease activity in counties -Widespread (purple) not permitted for in-person instruction -Substantial (red) can reopen if county in this category for at least 2 weeks -Moderate (orange) - open -Minimal (yellow) - open	-Two day rotation blended learning model -A/B blended learning model -Looping model (stay with same teacher for multiple grades) -Early/late staggered schedules	Yes, used to guide reopening plans in tiered approach <i>Local health data</i> - number of new infections per 100,000 residents -test positivity <i>Health system capacity</i> -change in hospitalization rate <i>3 additional metrics not mentioned also used</i>	All staff and students in 3rd grade or higher required 2nd grade and lower strongly encouraged. Face masks provided if needed	Health screen for anyone entering schools	✓	✓		✓	✓
FL	7/6/20	Schools required to reopen at least 5 days per week for all students, subject to FL and local DOH. Districts submitted reopening plans to satisfy state order.	Varies by county level plans	None specified	Varies by county level plans	Varies by county level plans	✓ appropriate to community situation	✓	Varies by county level plans	Varies by county level plans	Varies by county level plans
GA	8/12/20	Open, partial and total closures based on consultation with health department when cases arise	None specified	None specified	Not mandated; strongly recommended if feasible and when physical distancing is difficult.	Conduct symptom screening and temperature monitoring for all individuals entering building daily OR parent/guardian attestation	✓	✓	✓		✓

IL	8/17/20 9/15/20	In-person instruction permitted, use CDC indicators of community transmission to guide decision making. Use adaptive pauses as needed County metrics coded as blue (stable) or orange (warning signs of increased risk). -Substantial: orange metrics for >2 weeks, case counts ≥100 per 100,000 over 14 days, >20% increase in cases over 2 weeks, youth cases increase > 20% over 2 weeks, test positivity >8% -Moderate: transitioned to orange metrics at least once in last 4 weeks, case counts >50 to <100 per 100,000 over 14 days, >10-20% increase in cases over 2 weeks, youth cases increase >10-20% over 2 weeks, test positivity >5-8% -Mild: blue metrics for 4 weeks, case counts <50 per 100,000 over 14 days, >5-10% increase in cases over 2 weeks, youth cases increase >5-10% over 2 weeks, test positivity <5% -Adaptive pause: (delay reopening or pivot to distance learning)	At discretion of each district, suggestions include: -Distance learning -In-person -Hybrid -Cohorting -Alternating schedules Use adaptive pause for some level of distance learning as needed	Yes, CDC <i>Community transmission</i> Number of new cases per 100,000 persons within the last 14 days % positivity during the last 14 days <i>Implementation of mitigation strategies in schools</i> Mask use Social distancing Sanitation Support contact tracing Secondary indicators to also consider % change in new cases per 100,000 in last 7 days % inpatient hospital beds used % hospital ICU beds used % inpatient hospital beds used for COVID-19 patients Presence of local COVID-19 outbreak(s)	-Plans should cover importance of masking, refer to CDC mask guidance in schools	Parents/guardians and students and staff should screen for illness daily.	✓	✓	✓	✓	
KS	9/21/20	In-person - low restrictions Hybrid - moderate restrictions Distance learning - high restrictions https://www.ksde.org/Home/Quick-Links/News-Room/state-board-of-education-accepts-school-reopening-guidance-document-1	In-person Hybrid Distance learning Districts might consider staggering school day (half-day rotation, one-day rotation, two-day rotation, or A/B week) and/or students' schedules.	Daily case rate Low restrictions: case rate low or steady decline Moderate restrictions: case rate flat High restrictions – case rate increasing over 4-6 weeks or less	Masks or face coverings should be used while inside school, and required when social distancing and cohorting cannot be maintained, and outside when social distancing is not possible.	Staff screen daily by temperature checks daily. Best practices suggest taking student temperatures.	✓	✓	✓	✓	✓

MI	6/30/20	Based on MI Safe Start Phases 1-6 for counties -Phase 1-3: Only licensed child care if protocols followed -Phase 4: In-person permitted with stringent safety protocols -Phase 5: In-person permitted with moderate safety protocols -Phase 6: In-person permitted with minimal safety protocols	None specified	Yes, MI Safe Start Phases 1-6 <i>Community spread</i> -number of new cases per million -trends in new daily cases -test positivity <i>Health system capacity</i> -hospital capacity -PPE availability <i>Epidemic control</i> -Testing capacity -Tracing and containment effectiveness	Phase 4-5: Required by adults and grade 6-12 students in classrooms, common areas, and hallways. Grade K-5 and special needs students in hallways; not required in classrooms if students remain exclusively in class cohort throughout the day but strongly recommended.	-Required based on local health department guidance (Phase 4) <i>Recommend (Phase 4-5)</i> -Staff screen for symptoms and conduct temperature checks -Families recommended to screen students and conduct temperature checks	✓	✓	✓	✓	✓
NY	Jul-20	Plans specific to local school, district, Boards of Cooperative Educational Services (BOCES), private school, or charter school of NY state	In-person instruction should consider phased-in approach or hybrid model. Consider prioritization of groups to receive in-person first based on educational or other needs (early grades, students with disabilities, English language learners,) and requirements for equity, capacity, physical distancing, PPE, feasibility, and learning considerations. Cohort students to the extent practicable. Consider staggered arrival/pick-up times.	None specified	Recommended use at all times (excluding meals, instruction with physical distancing, and short breaks) by all individuals but required whenever physical distancing cannot be maintained	Parents/guardians and staff members must conduct symptom screening and temperature checks daily before coming to school.	✓	✓	✓	✓	✓
TX	9/24/20	Open, plans specific to school districts. Schools required to provide on-campus attendance as option, subject to school closures and exceptions. Up to 8 weeks to temporarily limit in-person instruction permitted. High schools permitted to offer less than daily in-person instruction in efforts to maintain physical distancing.	None specified	None specified	Required while indoors in public, or outdoors in public, as per Governor's executive order if ≥ 10 years of age whenever physical distancing cannot be maintained from individuals outside of the household.	Teachers, staff and visitors self-screen for symptoms and temperature checks before attending school. Schools may request students to have health screens.	✓	✓	✓	✓	

VT	8/11/20	All schools will operate under the same step level as follows, unless epidemiologic conditions warrant otherwise: Step I: Distance learning Step II: In-person with enhanced physical distancing and for students who live in counties eligible for quarantine-free travel. Step III: In-person with distancing measures. Restrict attendance to those from limited transmission areas (counties eligible for quarantine-free travel) only. VT DOH will determine readiness to move schools to Step III. Recommend full-time in-person as soon as practical for children preK-grade 5; prioritize this age group if schools implement gradual/phased in-person reopening.	In Step II and III schools can choose between: In-person Hybrid Distance learning 2020-21 school year starting with Step II	<i>Steps based on:</i> <i>Community spread</i> -Downward trajectory of cases within 14 days; OR -Downward trajectory of test positivity within 14 days <i>Symptoms</i> - Downward trajectory of influenza-like illnesses within 14 days; AND, - Downward trajectory of COVID-like syndromic cases within 14-days <i>Health system capacity</i> -Capacity to treat all patients without utilization of crisis care standards; AND -Robust testing program in place for at-risk healthcare workers, including antibody testing	All staff and students required to wear while in school buildings and outside if physical distancing cannot be maintained.	Students/their families should conduct daily monitoring for COVID-19 exposures and symptoms. Schools should conduct temperature screening of students. If staff conduct temperature screening at home, they should report it daily.	✓	✓	✓	✓	✓
WI	Oct-20 10/15/20	Based on approval of plans of schools/districts	In-person Hybrid Distance learning	Schools will work with local health officers to determine appropriate strategies for phased reopening to monitor epidemiology before fully reopening.	All students and staff who are able to wear a mask should wear one.	Health screening daily at home for students by parent/guardians/caregivers. Teachers and staff should self-monitor for symptoms.	✓	✓	✓		✓

WA	9/15/20	Based on COVID-19 activity level and other considerations* -High*: >75 cases per 100,000 over 14 days -Moderate*: 25-75 cases per 100,000 over 14 days -Low: <25 cases per 100,000 over 14 days *Increasing trends in cases or hospitalizations *Test positivity >5% *Other health education risks/benefits to children and families *Test capacity	-High: distance learning strongly recommended, option for limited in-person small groups for highest need students (disabilities, homeless, farthest from educational justice, younger learners) -Moderate: distance learning strongly recommended (same as high), expand in-person learning to elementary students. Consider adding hybrid in-person for middle and high school if limited transmission in schools -Low: full-time in-person for all elementary students encouraged, and hybrid for middle and high school. Consider full-time in-person for middle and high school over time if space allows.	Cases per 100,000 over 14 days Trends in cases or hospitalization Test positivity	Promote and ensure use among students and staff	Schools ensure monitoring of symptoms and exposure history among students and staff (includes attestation)	✓	✓	✓	✓	
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Sweden

Sweden did not close schools for students in kindergarten through grade 9 in response to the COVID-19 pandemic. Schools were closed for students in upper secondary grades from around March 18 through June 14, 2020, after which schools were reopened for all students. No major adjustments to class size, lunch policies, or recess rules were instituted.⁹

Seroprevalence surveys conducted by the Swedish Public Health Agency found that the antibody prevalence in children/teenagers was 4.7% compared with 6.7% in adults age 20-64 and 2.7% in adults age 65-70. The relatively high rate in children suggests there may have been significant spread in schools.⁹ Despite high transmission among teenagers and younger children, Sweden's population does not appear to be close to herd immunity and continues to face disproportionately high case and fatality counts.¹⁸

Denmark

After a closure of schools that started around March 16, 2020, Denmark re-opened schools for children under 11 years of age on April 15, 2020 in response to early evidence that very few children got severely ill from COVID-19. Primary school children were the first to return to school, and students are kept in small groups with minimal contact with others outside their group. "Micro-groups" of students arrive at a separate time, eat lunch separately, stay in their own zones in the playground and are taught by one teacher.¹⁹ These groups consist of approximately 12 students, which was determined based on the maximum number of students that could occupy a room while maintaining sufficient physical distance between students and teachers. This has required dividing classes and teaching staff. Because many schools are designed to include both primary and secondary school children, limiting re-opening of schools to primary grade students has allowed for sufficient physical classroom space to accommodate the small class sizes. Without this approach, schools would need to have morning and afternoon shifts.

Students are assigned their own desks, which are spaced 6 feet apart from each other. During recess, children are allowed to play only in small groups. Handwashing and sanitization are additional components to school re-opening. Students are asked to wash their hands hourly. Students and staff are not asked to wear face masks. In the context of low community transmission, school re-opening in Denmark has not resulted in a significant increase in the growth rate of COVID-19 cases.⁴

Germany

Schools in Germany were closed starting around March 3, 2020 and reopened around May 4 for older age students. During the initial re-opening phase, students were assigned their own fixed desks that are spaced at least 6 feet away from other desks. The fixed location of desks combined with student seating charts could be used by contact tracers if necessary.¹⁹ School days were shortened and supplemented with online lessons, which allowed multiple groups of students to share classrooms with no more than 10 students. During this period, in the context of moderate community transmission, school re-opening in Germany was accompanied by increased transmission among students, but not school staff.⁴

Following the summer vacation, schools in Germany re-opened for children of all ages, with class sizes comparable to the pre-pandemic period. Students were divided into cohorts of several hundred students, cohorts were prohibited from mixing with one another, and teachers were assigned to specific

cohorts.¹⁰ Even as the rate of cases increased in the community, there were relatively few schools that were fully quarantined in response to cases in the school (*approximately 44 out of 33,000 schools*), and public health officials concluded that in almost all cases, transmission did not occur in schools.^{20,21}

Norway

In response to the COVID-19 pandemic, schools in Norway were closed on March 11, 2020.²² Re-opening of schools started on April 20 for kindergarten students followed on April 27 by students in grades 1 through 4.²³ The government recommended that classes be limited to no more than 15 students. Special precautions included having children wash their desks daily. Some schools divided their playgrounds.²⁴ School for students in grades 5 and above and universities initially remained closed. In the context of low community transmission, school re-opening in Norway has not resulted in a significant increase in the growth rate of COVID-19 cases.⁴

Since the initial response, schools in Norway have opened for all grades using a cohort approach. A national ‘traffic light’ model is used to determine infection control measures. A ‘green’ light indicates that schools can operate using regular hours, “yellow” indicates that schools must take measures to reduce physical contact and increase hygiene, and ‘red’ indicates that schools must limit class sizes and alter their school hours. Norway is currently at ‘yellow’.¹⁰

France

Starting on May 11, 2020, nursery and primary schools were re-opened across much of France.²⁴ On May 18, schools were re-opened for students aged 11 to 15 years old only in “green zones” where community transmission was limited. For students 15 to 18 years old, schools re-opened on June 22. All other students were back in classrooms by September 1.²⁵ Class sizes have been reduced and face masks are mandatory in secondary schools.

In response to a surge in new cases in the country in October 2020, the president of France ordered nightly curfews (9pm to 6am) in the cities of Paris, Aix-Marseille, Grenoble, Montpellier, Toulouse, Saint Etienne, Lille, Rouen and Lyon. Schools have remained open.

Belgium

Schools in Belgium were re-opened starting on May 18, 2020, with all nursery schools open by June 2, followed by all primary school grades by June 8.²⁶ Classroom size was limited to no more than 10 students.²⁴ Schools were using split schedules with students attending on alternate days. Teachers were encouraged to wear a face mask if social distancing cannot be guaranteed.²⁶ Children were grouped by class throughout the school day, including on the playground.

When the new school year started in September, some of the precautions regarding split schedules were dropped.²⁷ All children returned to classrooms for five full days a week. All teachers and children over the age of 12 were expected to wear masks.²⁸ However, teenagers now make up the country’s largest group of new infections.²⁹

Switzerland

Schools reopened in Switzerland on May 11, 2020 with strict social distancing measures in place.²⁴ Many schools have reduced class sizes in half and students attend in-person classes only two days per week to allow for space for the smaller class sizes.³⁰ Desks have been moved further apart and tape marks have been placed on the floor to aid students in maintaining appropriate physical distance. Hand sanitizing stations have been added throughout schools. School re-opening for students in grade 10 and above and for university students was delayed until June 8.

Greece

Kindergarten and primary school students in Greece returned to school starting on June 1, 2020. Class sizes were limited to 15 students and desks were spaced 1.5 meters apart.³¹ Breaks are staggered to allow for physical distancing on playgrounds. The return from summer break has sparked protests in Greece as COVID-19 continue to spread. Students are concerned over large class sizes and insufficient space for desks.³²

Israel

As of early May, Israel had experienced fewer than 300 deaths from COVID-19 and the government re-opened schools, along with restaurants and other public settings. Starting in early May, school re-opening was initially implemented by opening classes in smaller groups or "capsules." By May 17, limitations on class size were lifted.³³ Two weeks after school re-opening, COVID-19 outbreaks were observed in classrooms, including 130 cases in one school alone. By June 3, there were 200 confirmed COVID-19 cases and over 244 positive SARS-CoV-2 tests among students and staff across multiple schools. In response, the government ordered the closure of any school with cases of SARS-CoV-2 infection. By June 8, 139 educational institutions had been indefinitely closed out of 5,200 schools and 200,000 kindergartens.³⁴

Since the initial opening, the school system has remained open. Due to the crowded nature of the schools system, physical distancing of students within schools has not been widely adopted and control measures have focused on closing schools with reported cases, extensive testing, and quarantine of students and staff with a potential SARS-CoV-2 exposure.³⁵ Teachers and students older than 7 years are required to wear masks. By June 24, 2020, isolation and quarantine had affected approximately 1% of Israeli students.

On September 17, a three-week lockdown closed schools in Israel as daily infections in the country exceeded 4,500.³⁶ Although official guidelines for students' return are not yet clear, senior officials from the Health Ministry maintain that more stringent protocols, including requiring teachers to wear masks at all times, will be in place. Pre-kindergarten, kindergarten, and religious schools are expected to reopen shortly, but no firm date is in place as of October 15.³⁷ With some communities still seeing high levels of transmission, not all parts of the country are expected to renew in-person schooling.

Taiwan

While schools were never officially closed in Taiwan, the winter break was extended by two weeks and students returned to school on February 25, 2020.²³ Schools conduct temperature checks and some schools use plastic tabletop desk partitions. Face masks are required at all times and masks have

reduced the need to space desks further apart. Tents have been used to expand eating areas to increase physical distancing between students.³⁸ Student-athletes are allowed to practice with their teams, but competitions have been canceled.

Japan

Schools in Japan were closed on March 2, 2020. The Prime Minister announced on March 24 that the order closing schools would not be extended, leaving decisions about re-opening schools up to local municipalities.²³ The Ministry of Health issued guidelines for school reopening that includes measures such as opening windows to ventilate classrooms, maintaining physical distance, checking temperatures daily, and wearing face masks.

New Zealand

Schools re-opened in New Zealand on May 14, 2020 following closures that started on March 24. Parents who are not comfortable sending their children back to school are allowed to make “transition arrangements” with their school.³⁹ Early childhood centers record information about students that would be needed for contact tracing.²⁴

South Korea

Schools in South Korea began re-opening in late May 2020. In the Seoul metropolitan area, limits have been placed on the proportion of the student populations allowed to be present at one time, with high schools limited to two-thirds of their student population and kindergartens, elementary, middle, and special education schools limited to one-third of their students at a time.⁴⁰ Physical distancing measures have been put in place, including the use of plastic desktop dividers in classrooms and lunchrooms in many schools. The Korean CDC asked all school staff and students to wear face masks in school and to follow hygiene measures like coughing into their arms and washing hands.⁴¹ Temperature checks are required upon entering school buildings.

In the event that someone inside a school is confirmed to have SARS-CoV-2 infection, all staff and students are sent home wearing masks and an epidemiological investigation and disinfection is initiated.⁴¹

Soon after the start of re-opening, a number of schools closed again, while others postponed re-opening, in response to a surge in new COVID-19 cases. Schools in Seoul opened again on September 14 under a hybrid model of in-person and online classes.⁴²

Vietnam

Starting on May 18, 2020, schools in Vietnam were reopened and students without a fever were allowed to return to class. Mandatory temperature checks are conducted at the entrance to the school. Facemasks are required throughout the school day.³⁹ Attempts are made to maintain physical distancing.

Scotland

Scotland re-opened schools on August 11, 2020 with classrooms reconfigured to allow social distancing and increase ventilation. Facemasks are required in hallways, but not classrooms.⁴³ In spite of increased

emphasis on handwashing and other hygiene practices, teachers in Scotland are now calling for stricter measures as cases continue to rise.⁴⁴

Uruguay

In Uruguay, the 2020 school year began on March 2, 2020. Just 12 days later, on March 14, the first confirmed case of COVID-19 in the country shut down schools throughout the country.⁴⁵ Rural schools opened again on April 22, with urban schools following their lead in three stages, starting on June 1. The prioritization of rural schools for in-person instruction was based on a decision to first return students who may have the greatest challenges with online instruction. Uruguay adapted their School Feeding Programme to keep some schools open as food distribution centers even while classes were not being held, helping allay some concerns for vulnerable children.

Uruguay was able to take advantage of the relatively controlled spread of COVID-19 within its borders to develop detailed protocols for resuming in-person instruction. Their plans relied on a number of interventions to control transmission in schools, including regular testing of teachers and other staff, reduced classroom size, physical distancing, regular cleaning and ventilation of classrooms and other spaces, the use of face masks as recommended by the country's Ministry of Public Health, and frequent hand-washing. Children were screened for symptoms when they arrive at school. Finally, an aggressive testing campaign, using a nationally developed test kit and pooled samples, helped Uruguay ramp-up its testing rapidly.⁴⁶

Iran

After closing in February of 2020, schools in Iran reopened in most parts of the country on September 12.⁴⁷ Schools in some areas, designated "red zones," were kept closed due to high community transmission. In "yellow zones," including the capital, Tehran, lower community transmission prompted education officials to allow parents to decide whether to send their children to school. Where schools are open, the country has implemented a rotation system for schools with high enrollment, splitting students into groups who alternate in-person attendance with virtual learning. News reports indicate that students are wearing masks, maintaining physical distancing practices, and regularly being checked for fever.⁴⁸

South Africa

South African schools were initially closed between March 18 and June 1, 2020, during a period of total national lockdown. After pressure from the teachers' union and others amid surging case counts, the country announced a second closure on July 27.⁴⁹ Classes resumed for most students on August 24 and now remain open now.⁵⁰ South Africa's Department of Basic Education requires students to sanitize their hands before entering the classroom, keep face masks on in class, and maintain at least 1.5 meters of distance from others.⁵¹

Dashboard for Tracking School Re-opening and Cases Linked to Schools

Data reported by the [New York Times](#) on September 21, 2020 showed considerable variability in how school associated cases are reported by different states, with district-level data reported in some states,

partial data reported in others, and no publicly reported data in many states. There are a number of initiatives to track cases of SARS-CoV-2 infections and COVID-19 cases linked to schools in the US.

The COVID-19 School Response Dashboard (<https://covid schooldashboard.com>) is collecting data longitudinally from individual schools and school districts on confirmed and suspected COVID-19 cases in K-12 schools in the US.

New York State is tracking cases linked to schools on their [COVID-19 Report Card](#)

Michigan School-Related Outbreak Reporting: https://www.michigan.gov/coronavirus/0,9753,7-406-98163_98173_102480---,00.html

Clark County, Washington: <https://clark.wa.gov/public-health/covid-19-cases-schools>

Recommended Resources

- **School Closures Caused by Coronavirus (Covid-19)**¹ – UNESCO
<https://en.unesco.org/covid19/educationresponse>
- **Effects of School Closure on Incidence of Pandemic Influenza in Alberta, Canada**⁵² – Annals of Internal Medicine (Feb 7) <https://doi.org/10.7326/0003-4819-156-3-201202070-00005>
- **Contact Tracing Evaluation for COVID-19 Transmission during the Reopening Phase in a Rural College Town**^{53*} – Medrxiv (June 26) <https://doi.org/10.1101/2020.06.24.20139204>
- **The Effect of State-Level Stay-at-Home Orders on COVID-19 Infection Rates**⁵⁴ – American Journal of Infection Control (May 24) <https://doi.org/10.1016/j.ajic.2020.05.017>
- **Returning Chinese School-Aged Children and Adolescents to Physical Activity in the Wake of COVID-19: Actions and Precautions**⁵⁵ – Journal of Sport and Health Science (Apr 12)
<https://doi.org/10.1016/j.jshs.2020.04.003>
- **Hand Hygiene, Mask-Wearing Behaviors and Its Associated Factors during the COVID-19 Epidemic: A Cross-Sectional Study among Primary School Students in Wuhan, China**⁵⁶ – International Journal of Environmental Research and Public Health (Apr 22) <https://doi.org/10.3390/ijerph17082893>
- **Impact of School Closures for COVID-19 on the US Health-Care Workforce and Net Mortality: A Modelling Study**⁵⁷ – The Lancet Public Health (Apr 3) [https://doi.org/10.1016/S2468-2667\(20\)30082-7](https://doi.org/10.1016/S2468-2667(20)30082-7)
- **School Closure During the Coronavirus Disease 2019 (COVID-19) Pandemic: An Effective Intervention at the Global Level?**⁵⁸ – JAMA Pediatrics (May 13)
<https://doi.org/10.1001/jamapediatrics.2020.1892>
- **Socially Distanced School-Based Nutrition Program Feeding under COVID 19 in the Rural Niger Delta**⁵⁹ – The Extractive Industries and Society (Apr 21) <https://doi.org/10.1016/j.exis.2020.04.007>
- **No Evidence of Secondary Transmission of COVID-19 from Children Attending School in Ireland, 2020**⁶ – Euro Surveillance (May 28) <https://doi.org/10.2807/1560-7917.ES.2020.25.21.2000903>
- **Epidemiological Features and Viral Shedding in Children with SARS-CoV-2 Infection**³ – Journal of Medical Virology (June 15) <https://doi.org/10.1002/jmv.26180>

- **School Opening Delay Effect on Transmission Dynamics of Coronavirus Disease 2019 in Korea: Based on Mathematical Modeling and Simulation Study** ⁶⁰ – Journal of Korean Medical Science (Apr 1) <https://doi.org/10.3346/jkms.2020.35.e143>
- **Impact of Public Health Interventions on Seasonal Influenza Activity During the SARS-CoV-2 Outbreak in Korea** ⁶¹ – Clinical Infectious Diseases (May 30) <https://doi.org/10.1093/cid/ciaa672>
- **The Severity of COVID-19 in Children on Immunosuppressive Medication** ⁶² – The Lancet Child & Adolescent Health (May 13) [https://doi.org/10.1016/S2352-4642\(20\)30145-0](https://doi.org/10.1016/S2352-4642(20)30145-0)
- **The Role of Children in the Dynamics of Intra Family Coronavirus 2019 Spread in Densely Populated Area** ⁵ – Pediatric Infectious Disease Journal (June 1) <https://doi.org/10.1097/INF.0000000000002783>
- **Shut and Re-Open the Role of Schools in the Spread of COVID-19 in Europe** ⁴ – Medrxiv (June 26) <https://doi.org/10.1101/2020.06.24.20139634>
- **De-Escalation by Reversing the Escalation with a Stronger Synergistic Package of Contact Tracing, Quarantine, Isolation and Personal Protection: Feasibility of Preventing a COVID-19 Rebound in Ontario, Canada, as a Case Study** ⁶³ – Biology (May 16) <https://doi.org/10.3390/biology9050100>
- **School Closure and Management Practices during Coronavirus Outbreaks Including COVID-19: A Rapid Systematic Review** ⁶⁴ – The Lancet Child & Adolescent Health (Apr 6) [https://doi.org/10.1016/S2352-4642\(20\)30095-X](https://doi.org/10.1016/S2352-4642(20)30095-X)
- **Mental Health Status Among Children in Home Confinement During the Coronavirus Disease 2019 Outbreak in Hubei Province, China** ⁶⁵ – JAMA Pediatrics (Apr 24) <https://doi.org/10.1001/jamapediatrics.2020.1619>
- **Recognizing and Controlling Airborne Transmission of SARS-CoV-2 in Indoor Environments** ⁶⁶ – Indoor Air (July 19) <https://doi.org/10.1111/ina.12697>

Annotated Bibliography

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3. Hua C-Z, Miao Z-P, Zheng J-S, et al. Epidemiological features and viral shedding in children with SARS-CoV-2 infection. *J Med Virol*. June 2020. doi:10.1002/jmv.26180
 - An analysis of all children (n=314) from families with SARS-CoV-2 infected members in Zhejiang Province, China found incidence in children who were close contacts was significantly lower than in adults who were close contacts (13% vs 21%). Among 43 pediatric cases, the mean age was 8.2 years and mean incubation was 9.1 days, 77% had mild pneumonia and the remainder were asymptomatic. While SARS-CoV-2 RNA could be detected in stool samples in 91% of cases and for over 70 days in some children, no family contacts of these children were subsequently infected.
4. Stage HB, Shingleton J, Ghosh S, Scarabel F, Pellis L, Finnie T. Shut and re-open the role of schools in the spread of COVID-19 in Europe. *medrxiv*. June 2020. doi:10.1101/2020.06.24.20139634
 - Stage et al. compared daily hospitalization trends in northern European countries (Denmark, Norway, Sweden, and Germany), and found that the growth rate of COVID-19 cases declined approximately 9 days after implementation of school closures.
 - Limited school attendance did not appear to significantly affect transmission.
 - Reopening of schools for all students in countries with low community transmission (Denmark and Norway) has not resulted in a significant increase in the growth rate of COVID-19 cases. Return of most students to school in countries with higher levels of community transmission (Germany) has been accompanied by increased transmission among students, but not school staff.
5. Somekh E, Gleyzer A, Heller E, et al. The Role of Children in the Dynamics of Intra Family Coronavirus 2019 Spread in Densely Populated Area. *Pediatr Infect Dis J*. 2020; Publish Ah. doi:10.1097/INF.0000000000002783
 - Among 13 family clusters in a city in Israel, after removing the index case, 58% of adults became SARS-CoV-2 positive by PCR compared to 33% of children 5-17 years and 12% of children less than 5 years of age. Children appeared to play a smaller role in transmission of SARS-CoV-2 than adults.
6. Heavey L, Casey G, Kelly C, Kelly D, McDarby G. No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020. *Euro Surveill*. 2020;25(21). doi:10.2807/1560-7917.ES.2020.25.21.2000903
7. Szablewski C, Chang K, Brown M, Al. E. SARS-CoV-2 Transmission and Infection Among Attendees of an Overnight Camp — Georgia, June 2020. *MMWR Morb Mortal Wkly Rep*. 2020. doi:10.15585/mmwr.mm6931e1
 - An outbreak investigation in an overnight camp in Georgia found evidence of widespread transmission of SARS-CoV-2 among children of all ages. SARS-CoV-2 tests were available for 344 of 597 camp attendees, of whom 260 (76%) were positive. The overall attack rate was 44% (260 of 597). The attack rate was 51% among those aged 6–10 years, 44% among those aged 11–17 years, and 33% among those aged 18–21 years.

- The camp involved large groups sleeping in the same cabin and engaging in singing, cheering, and both indoor and outdoor activities. Use of cloth masks was not required among campers. All trainees, staff members, and campers provided documentation of a negative viral SARS-CoV-2 test ≤ 12 days before arriving.
 - An ongoing investigation into specific exposures associated with infection, illness course, and secondary transmission to household members is being conducted.
8. Stein-Zamir C, Abramson N, Shoob H, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. *Eurosurveillance*. 2020;25(29):2001352. doi:10.2807/1560-7917.ES.2020.25.29.2001352
 - An extensive outbreak investigation in a school (grades 7-12) in Jerusalem (Israel) found evidence of SARS-CoV-2 transmission within the school. After re-opening on May 17 after a two month closure, the first school outbreak occurred 10 days later. There was an indication that transmission was largely confined to certain grades, and to specific classrooms within those grades.
 - As part of the outbreak investigation, SARS-CoV-2 testing was conducted on 1,161 of 1,164 students and 151 of 152 staff members. Overall, 13.2% of students and 16.6% of staff had SARS-CoV-2 infection, of whom 43% of students and 76% of staff were symptomatic. One emergency room visit was recorded and there were no hospitalizations.
 - Prevalence of SARS-CoV-2 among students in the school at the time of testing was highest in grades 7-9 (17.3% to 32.6%) compared to grades 10-12 (1.6%-4.5%). Even within the younger grades, cases appeared to be clustered within specific classrooms.
 - An environmental school inspection reported crowded classes (35-38 students per class). While facemasks were initially required, this mandate was removed during a heatwave that occurred within days of the school re-opening.
 - Contact tracing of close contacts of cases from the school identified 87 additional cases.
[EDITORIAL NOTE: From this report, it is not clear how many close contacts were tested or the proportion of contacts who were positive for symptomatic versus asymptomatic cases]
 9. Vogel G. How Sweden wasted a 'rare opportunity' to study coronavirus in schools. *Science* (80-). May 2020. doi:10.1126/science.abc9565
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 11. Chu VT, Yousaf AR, Chang K, et al. Transmission of SARS-CoV-2 from Children and Adolescents. *medRxiv*. October 2020. doi:10.1101/2020.10.10.20210492
 - Children and adolescents who acquired SARS-CoV-2 infection during an overnight camp in June transmitted the virus to both pediatric and adult contacts in their households, with 10% of the adult secondary cases requiring hospitalization, based on a retrospective cohort study from Georgia. Among 526 tested household contacts of 224 infected individuals, 48 secondary cases were identified, corresponding to a secondary attack rate (SAR) of 9%. The authors note that because the exposure at camp was known, many of the young people self-isolated or wore masks upon returning home, potentially contributing to a lower SAR than had been observed in other studies.
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- Among 59,073 contacts of 5,706 COVID-19 index cases in South Korea monitored for an average of 9.9 days after index case diagnosis, 12% of household contacts acquired COVID-19, versus 2% for non-household contacts. Probability of a contact being positive was highest for household contacts when the index case was 10-19 years old (19%); however, only 2% of index cases were in this age group. Among non-household contacts, the highest proportion of positive contacts was among index case who were 70 years of age or older.
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 - Ladhani et al. analyzed public health surveillance data including 540,305 people tested for SARS-CoV-2 in England through May 3, 2020 and found that 1408/35,200 (4%) tests were positive among children younger than 16, compared to 19%-35% positive among adult age groups. Children accounted for 1.1% of SARS-CoV-2 positive cases. These included 8 deaths among children, three of whom had multiple co-morbidities and an additional four in whom SARS-CoV-2 was determined to be an indirect contributor to death from another cause. There was no evidence of excess mortality in children during this period.
 14. Leeb RT, Price S, Sliwa S, et al. COVID-19 Trends Among School-Aged Children — United States, March 1–September 19, 2020. *MMWR*. 2020;69. doi:10.15585/mmwr.mm6939e2
 - The incidence of SARS-CoV-2 infection in school-age children increased from March and peaked in July and August, followed by a decline in September. During March 1–September 19, 2020, the US reported a total of 277,285 laboratory-confirmed cases of COVID-19 in school-aged children. The average weekly COVID-19 incidence among adolescents aged 12–17 years was approximately 2-fold higher than among children aged 5–11 years (37.4 vs. 19.0 per 100,000). The weekly incidence increased to a peak of 34-38 per 100,000 in July and August and decreased with a slight rebound to 23-26 per 100,000 in early September. Trends in incidence were similar among both age groups.
 - The authors note that these estimates provide a baseline to monitor transmission among school age children as schools reopen for in-person learning in some districts around the country.
 15. Schwartz NG, Moorman AC, Makaretz A, et al. Adolescent with COVID-19 as the Source of an Outbreak at a 3-Week Family Gathering — Four States, June–July 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(40):2019-2021. doi:10.15585/mmwr.mm6940e2
 - An adolescent (13 years old) was the index case of an outbreak that occurred during a 3-week family gathering where 11 of 14 attendees developed COVID-19, despite the index case testing negative with a rapid antigen test prior to the gathering. Six other family members who maintained physical distancing by remaining outdoors did not develop COVID-19.
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