Filling in the Blanks: National Research Needs to Guide Decisions about Reopening Schools in the United States

Johns Hopkins Bloomberg School of Public Health
Center for Health Security

Authors

Anita Cicero, JD
Deputy Director, Johns Hopkins Center for Health Security
Visiting Faculty, Johns Hopkins Bloomberg School of Public Health

Christina Potter, MSPH
Analyst, Johns Hopkins Center for Health Security
Research Associate, Johns Hopkins Bloomberg School of Public Health

Tara Kirk Sell, PhD, MA
Senior Scholar, Johns Hopkins Center for Health Security
Assistant Professor, Johns Hopkins Bloomberg School of Public Health

Caitlin Rivers, PhD, MPH
Senior Scholar, Johns Hopkins Center for Health Security
Assistant Professor, Johns Hopkins Bloomberg School of Public Health

Monica Schoch-Spana, PhD
Senior Scholar, Johns Hopkins Center for Health Security
Senior Scientist, Johns Hopkins Bloomberg School of Public Health

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Contributors

Annette Campbell Anderson, PhD
Assistant Professor, JHU School of Education
Deputy Director, Johns Hopkins Center for Safe and Healthy Schools

Carolina I. Andrada
Analyst, Johns Hopkins Center for Health Security
Research Assistant, Johns Hopkins Bloomberg School of Public Health

Megan E. Collins, MD, MPH
Assistant Professor
Johns Hopkins Wilmer Eye Institute and Berman Institute of Bioethics

Sara B. Johnson, PhD, MPH
Associate Professor of Pediatrics
Johns Hopkins School of Medicine and Johns Hopkins Bloomberg School of Public Health

Diane Meyer, RN, MPH
Managing Senior Analyst, Johns Hopkins Center for Health Security
Research Associate, Johns Hopkins Bloomberg School of Public Health

Lucia Mullen, MPH
Analyst, Johns Hopkins Center for Health Security
Research Associate, Johns Hopkins Bloomberg School of Public Health

Jennifer Nuzzo, DrPH, SM
Senior Scholar, Johns Hopkins Center for Health Security
Associate Professor, Johns Hopkins Bloomberg School of Public Health

Joshua M. Sharfstein, MD
Professor of the Practice in Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

Elizabeth A. Stuart, PhD
Professor, Departments of Mental Health, Biostatistics, and Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

Eric Toner, MD
Senior Scholar, Johns Hopkins Center for Health Security
Senior Scientist, Johns Hopkins Bloomberg School of Public Health

Rachel A. Vahey, MHS
Graduate Research Assistant, Johns Hopkins Center for Health Security

Kelsey Lane Warmbrod, MS, MPH
Analyst, Johns Hopkins Center for Health Security
Research Associate, Johns Hopkins Bloomberg School of Public Health

Crystal Watson, DrPH, MPH
Senior Scholar, Johns Hopkins Center for Health Security
Assistant Professor, Johns Hopkins Bloomberg School of Public Health

Tom Inglesby, MD
Director, Johns Hopkins Center for Health Security
Professor, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins School of Medicine

Executive Summary

Most elementary schools, middle schools, and high schools across the United States have been closed since March in an effort to reduce the spread of COVID-19. Schools that are able to do so have replaced classroom education with remote learning, using a range of tools and approaches. As of the publication of this report, governors from most US states have recommended or ordered that schools remain closed for the remainder of this academic year, affecting more than 50 million public school students. While a few schools may reopen before the end of the current school year, most schools, students, and their families in the United States are now facing uncertainty about whether or how schools will resume for in-class learning in the fall.

The White House issued guidelines for Opening Up America Again on April 16, 2020; many states have already finalized or are developing their own plans and taking steps toward reopening businesses, communities of faith, and other settings. Not all states that are now relaxing physical distancing restrictions have met the gating criteria set out in the White House guidelines, but they are motivated to reopen in order to blunt economic losses resulting from shut-down orders. School closures will have a direct impact on the ability to reopen the economy. Realistically, it will be difficult for many adults to return to work in person if their children are not back in school in the fall. Likewise, closures of summer camps, daycare centers, and after-school activities also affect the ability of many adults to return to work.

A host of guidance documents related to COVID-19 mitigation strategies for schools have recently been issued by various government and nongovernment organizations at the national and international levels. And a number of countries in Europe and Asia are now implementing a variety of approaches for returning K-12 schoolchildren to school. This report includes a summary and detailed Appendix on a selection of country approaches to school reopening. It is important to track these efforts and the implementation of the various guidances closely. Still, it will be difficult to tease out lessons learned absent rigorous study, since many adults will be returning to work, and physical distancing restrictions will be eased contemporaneously with schools reopening.

There is an urgent need to understand the evidence that would support how students could safely return to school. This is an extremely difficult decision, because of the uncertainties relating to risk. While published studies to date indicate that children with COVID-19 are less likely than adults to suffer severe illness, there is only limited scientific evidence, models, and anecdotal accounts attempting to gauge whether children with COVID-19 in school can efficiently transmit the virus to other children, teachers, school staff, and family members. Unanswered questions include: How vulnerable to severe illness are students who have underlying health conditions, such as asthma, diabetes, or severe obesity? How safe is it for adults who themselves have serious underlying health conditions to send their children back to school without fear of those children bringing the virus home and infecting others in the family?

How safe is it for teachers, administrators, and other school staff, especially those who are medically vulnerable, to return to school and interact with students who may be asymptomatic but infectious? Are certain school communities at greater risk than others relative to exposure, and should each school community be evaluated independently to determine level of risk?

We need a national mandate to prioritize and quickly fund research to answer these scientific questions about children and COVID-19 so that governors, schools, teachers, and guardians can have greater certainty about the potential consequences related to reopening schools and can make informed decisions. While some studies are getting under way, the US government (as well as other national governments, nongovernment organizations, and philanthropies) should fund additional studies aimed at understanding the role of children in transmission of COVID-19. As schools reopen, models are not sufficient to determine the actual risk to school-aged children and the teachers and caregivers in their lives, given that available scientific evidence is not conclusive and continues to evolve.

Transmissibility studies, especially epidemiologic investigations using contact tracing and other data, are needed to understand COVID-19 transmission dynamics in school-aged children. We should also closely track the experience in countries where schools are starting to reopen during the pandemic and in those places in the United States that decide to open schools this spring or summer. For countries where schools have opened recently, formal case studies and cohort studies comparing whether transmission is occurring in families of students or in teachers or staff in those schools will be very important. Support for this critical research is now needed to fill in the blanks of our knowledge as much as possible as schools in the United States decide how and under what conditions they will open their doors during the 2020-21 school year. To help maintain momentum and focus, a national advisory group composed of pediatric, public health, and education researchers should be established to regularly review the state of the science and provide coherent updates on key questions, including recommendations supported by data.

Overview and Scope of This Report

Although data should be central to decisions about how to reopen schools, evidence related to the burden of COVID-19 in children and children's role in COVID-19 transmission dynamics has been slow to come for many reasons. In general, data gathered to date indicate that children with COVID-19 do not typically get as severely ill as adults, with only a small percentage suffering serious complications or death. This makes it more likely that asymptomatic and mild COVID-19 cases in children have gone undetected. This is likely to have been especially true since limited diagnostic testing has been used primarily for hospitalized patients and those presenting with more severe illness. In this report, we briefly summarize key findings of a selection of published pediatric COVID-19 literature, and we provide recommendations for areas where

additional study and expedited research are needed. Recognizing that many countries are opening schools now, we summarize the approaches and plans of several countries in their efforts to resume in-classroom education, as it will be important to observe whether and how these measures ultimately affect disease transmission.

This report focuses primarily on research needed to improve the evidence base relating to children, teachers, and other staff in daycare and in schools serving pre-K through 12th grade. This report does not include a focus on boarding schools, colleges, or universities because the congregate living arrangements common to these settings present different challenges. Those settings are outside the scope of this report and deserve their own strategies and lines of research.

The Importance of Schools for Classroom-Based Instruction and Resources

The closure of schools across America occurred quickly in the setting of a rapidly worsening pandemic, and schools did not have much time to plan for remote education and other services typically provided in many school settings (eg, food, health care). Because of the uncertainty surrounding the spread of COVID-19, many schools assumed that classroom education would resume after a period of a few weeks. Most online programs were put together quickly, and the transition from classroom-based instruction to remote learning was difficult. Challenges were particularly severe for many students and teachers who have limited access to technology and technical support.

Schools provide much more than academic instruction for children. Schools also afford opportunities for social development and are settings for the delivery of critical resources such as physical and mental health services, special education, gifted instruction, developmental assessments and services, and social support services, and they are sometimes a haven for children subjected to abuse in the home. Schools also provide meals for low-income students, including free or discounted lunches to more than 20 million. School-based health centers are an essential part of the healthcare system, particularly as safety net providers. Decisions to close or reopen schools need to take these factors into account, in addition to academic considerations.

The longstanding digital divide raises concerns regarding the resources students have in place to facilitate remote learning. Schools have made noble efforts to quickly convert to online learning systems, but equity issues are abundant. Not all families own a laptop, let alone enough laptops for each of their children. Not all children have equal access to the internet or access to software needed for class. For instance, a recent survey conducted by the Public School Superintendent's Association of Maryland found that as many as 25% of students in some school districts in Maryland either had not signed on to the internet to do lessons or had not picked up a paper-based learning packet to complete since schools closed. These types of inequities may be widening the socioeconomic status achievement gap.

Certain students, such as those who are marginalized, vulnerable, or have special needs, are likely to suffer the most from school closures given that, in many cases, these students may have required additional in-person support to meet academic standards before the arrival of COVID-19. Schools serving populations of students with greater needs may also have fewer resources and greater challenges than other schools, making the transition to remote or online learning even more difficult. Because of these inequities, COVID-19–related school closures may increase the likelihood of a widening learning loss among our most vulnerable students as the pandemic extends through the end of the academic year and potentially into next year.

Equity is a key factor to consider in any discussions about school closure and reopening. Lessons from previous school closures show us that children who are more vulnerable require more services and assistance to successfully transition back to learning in school. Equity issues aside, remote learning requires more adult supervision for young learners, and, in general, remote learning is more challenging for younger school-age children, a fact often cited by countries that are reopening first for primary school–aged children.

State of Scientific Understanding

Coronavirus disease 2019 (COVID-19) is an illness caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Information about children with COVID-19 is limited but growing. Below we provide an overview of key findings from a number of published studies. This information is not a comprehensive literature review but is intended to provide a general summary of the current state of the literature as it relates to the incidence of COVID-19 in children, the frequency of severe illness, and the role of children in transmission of SARS-CoV-2.

Incidence

It is important to note that children of all ages are susceptible to infection with SARS-CoV-2, but there is also an apparent reduced incidence of disease in children compared to adults. For example, in the United States, the Centers for Disease Control and Prevention (CDC) has reported that less than 2% of COVID-19 cases reported by April 2, 2020, were in children under 18 years of age, while children make up approximately 22% of the US population. In Italy, by March 15, 2020, 1.2% of identified cases were 18 or younger. While these findings provide evidence that there may be reduced susceptibility to the disease in children, mild or asymptomatic cases—which may make up the bulk of infections in children—are less noticeable and may go undetected and untested.

Incidence may also vary across the pediatric age spectrum, with a general increase in numbers of cases as children get older. In the United States, where data collection has been limited, among 2,572 pediatric COVID-19 cases, 15% occurred in children who were under 1 year old, 11% occurred in children ages 1 to 4 years, 15% occurred in children ages 5 to 9 years, 27% occurred in children ages 10 to 14 years, and 32% occurred in children ages 15 to 17 years.

In Iceland, testing of 6% of the population showed that children under 10 years of age were less likely to be positive than people who were over the age of 10 (6.7% vs 13.7%). In South Korea, which also conducted extensive testing, 1% of cases were found in children ages 0 to 9, while 5.2% of cases were found in the 10 to 19 age group. In a preprint (not yet peer reviewed) study, it was reported that in Vo, Italy, at the beginning of that city's lockdown, a large fraction of the city's population was tested, and the prevalence of COVID-19 across all ages was found to be 2.6%. Those tested included 217 children between the ages of 1 and 10 (none of whom tested positive) and 250 people aged 11 to 20 (1.2% of them tested positive). At the end of the lockdown, the prevalence of COVID-19 across all ages tested was 1.2%. None of the 157 tested between the ages of 0 and 9 was positive, and only 1% of the 210 people tested between the ages of 11 and 20 tested positive. Notably, 43% of all people (adults and children) tested in Vo across the 2 surveys were asymptomatic.

Several studies have shown that attack rates—that is, the proportion of people in an initially uninfected community who become ill—are lower in children as compared to adults. However, evidence is mixed. In a study of 105 index cases and 392 household contacts near Wuhan, China, the attack rate in children in the household was 4% as compared to 17% in adults and 27% for spouses specifically. Another study of 2,541 contacts reported from 1,193 cases in Wuhan and Shanghai showed that children who were in households with a COVID-19 case were a third as likely to become infected with SARS-CoV-2 compared to adults, whereas individuals over 65 were nearly 1½ times as likely as younger adults to become infected. In a third study of 770 exposed household members in Guangzhou, China, those less than 20 years of age had a lower attack rate of 5.3% compared to an overall attack rate of 12.6%. In contrast, a different study of 1,286 contacts of 391 cases in Shenzhen showed that children in households were equally likely as adults to be infected. As a result, although there are indications that children may be less susceptible to the disease, this conclusion cannot be made with confidence.

Severity

While much is unknown about COVID-19 in children, studies have provided fairly definitive and reassuring information on severity in children compared to severity in adults. Healthy children are much less likely than adults to develop severe disease from COVID-19—meaning that they are unlikely to be hospitalized in such numbers as to be contributors to healthcare system overload. In particular, children are more likely to develop asymptomatic infection or mild disease. Of 2,143 pediatric cases reported to China CDC by February 8, 94.1% were considered asymptomatic, mild, or moderate.

Reports that a substantial percentage of diagnosed pediatric cases have been hospitalized should be viewed in the context of limited testing. In Madrid, of the 4,695 COVID-19 cases diagnosed by the middle of March, 41 were children and (60%) of those 41 were hospitalized. Early data collected on cases in the United States were not uniformly detailed enough to know hospitalization status of all pediatric cases. But for the subset of pediatric cases diagnosed between mid-February and early April, where

hospitalization status was known, 5.7% of infected children were hospitalized. It is important to take into account that due to the need to conserve limited tests, severely ill patients are prioritized for testing, which likely results in an overestimation of hospitalization rates for COVID-19 cases.

Severe outcomes from COVID-19 are rare in children. Of the first 44,672 cases reported from China, no deaths were reported in children under the age of 10, and 1 death was reported in a child between the ages of 10 and 19. Data from 149,082 COVID-19 cases in the United States occurring between February 12 and April 2 showed only 3 pediatric deaths. Complications are rare, but they have been reported. A study in China (with 14 children) found substantial lung injury in children whose clinical symptoms were mild.

A pediatric multisystem inflammatory syndrome recently observed in at least 100 children in New York (including 3 who died) has raised concerns that it may be linked to COVID-19. The presentation of disease in these children, many of whom tested positive for COVID-19 or had its antibodies, appears similar to Kawasaki disease, which causes inflammation in the walls of blood vessels, including those that supply blood to the heart. Although the current incidence of this outcome is quite low, any association with COVID-19 should be further explored in order to better understand the risk factors and how its potential spread might affect plans to reopen schools.

Pre-existing underlying health conditions in children seem to be an important factor for children who have COVID-19 and require admission to pediatric intensive care units (PICUs). Out of 48 children admitted to 46 PICUs in North America across a 3-week period this spring, 83% of them were found to have significant pre-existing comorbidities and 4% died.

Transmission from Children

Since adults experience more severe illness and death than children, knowing the risks of asymptomatic spread from children to adults is a central question. Studies to improve understanding of the role of children in transmission of COVID-19 are beginning to emerge. One study involving 3,712 COVID-19 patients showed that viral loads of SARS-CoV-2 are similar in children as compared to adults. This means that infected children have a similar amount of virus particles in testing samples as adults. Although it is not a given that viral load is a primary indicator of transmissibility in COVID-19 cases, this finding could support the idea that children are as infectious and able to transmit the disease as easily as adults. However, case investigations conducted to date suggest that transmission is not particularly frequent. Research conducted in the Netherlands (which has been summarized but not yet shared) to determine the ages of primary COVID-19 cases and their contacts suggests that children have a much smaller role in transmission than the elderly and adults. Still, in a study in China of 10 pediatric cases of COVID-19, a 3-month-old child likely passed the infection to at least 1 adult in her household, indicating that transmission from children to adults is possible.

One limitation in the understanding of how children may spread COVID-19 is that children have been sequestered more than adults in this outbreak, so they are less likely to initiate disease transmission chains. Another important limitation in interpreting the studies to date is that they were almost all done when children were out of school and not around other children, so children were not in conditions that would resemble school settings.

Data on the potential transmission of COVID-19 in the school setting is limited because of the widespread closure of schools across the world. Studies that have been conducted to date provide mixed data on likely settings for transmission of COVID-19. In Australia, 735 students and 128 staff who were close contacts of 18 initial COVID-19 cases were followed prior to school closures. One child from a primary school and 1 child from a high school may have contracted COVID-19 from the initial cases at their schools. No teacher or staff member was found to have contracted COVID-19 from the initial school cases. A systematic review of available literature and media reports showed only a small number of case clusters linked to schools. In these reports, the COVID-19 cases were most often in teachers or other staff.

Another systematic review of the effectiveness of school closures in other coronavirus outbreaks, such as for SARS, showed that school closures did not contribute to the control of those outbreaks. However, it should be noted that SARS was transmitted frequently in hospital settings and rarely spread in the community outside of hospitals, decreasing the likelihood that it would appear in schools in the first place. One contrasting study in France showed that infection attack rates were higher in a high school setting (40.9%) than in community households (10.9%), suggesting that, in this case, the school might have been an important setting for disease transmission.

Models

While modeling studies can be useful, the predictive nature and accuracy of models can vary widely. There have been a number of modeling groups that have drawn on existing data to attempt to project out the impact of reopening schools on community spread of COVID-19. Epidemiologic modeling of the effectiveness of school closure has shown that lower and delayed disease peaks may result from school closure. One comparison of interventions indicated that school closures may result in a 2% to 4% relative decrease in numbers of deaths from COVID-19. Another study analyzing the effectiveness of social distancing measures and school closures found that school closures were unlikely to entirely inhibit disease transmission but were likely to reduce the infection attack rate and peak incidence of the outbreak. The authors concluded that school closures alone are not sufficient to prevent outbreaks from growing, but they can help flatten the curve to avoid overwhelming critical infrastructure. In another modeling study, Dutch researchers determined that primary schools will have little impact on disease transmission, whereas secondary schools were more likely to contribute to transmission, in large part because secondary schools, unlike primary schools, tend to draw students from a larger number of regions and communities.

Current Guidance and Country Approaches

Although many gaps remain in our understanding of COVID-19 transmission risk factors associated with reopening schools, much may depend on how vigilant schools will be in maintaining social distancing among students, teachers, and staff when they open. As the United States looks forward to the 2020-21 school year, leaders and stakeholders should review existing guidance on the subject and closely track any clusters of cases that may result from the reopening of schools in the United States and elsewhere.

Notable Existing Guidance

Various organizations at the national and international levels have released guidance on how to proceed with opening schools and childcare programs during the COVID-19 pandemic. Guidelines published to date cover a wide variety of topics, including how to reduce the chances of transmission in these settings (through infection control practices and physical distancing), what to do if a case is identified, contingency planning for continuity of learning if community spread is identified, mental health support services, communication and engagement within the community, and support for vulnerable populations, including children with disabilities and those who are economically disadvantaged. There has not yet been enough time for the guidance documents to be evaluated for effectiveness, practicality, or feasibility, but across these guidance documents, recommendations seem to be based on the assumption that children are at risk of both infection with COVID-19 and onward transmission of the disease to their peers and the adults in their lives.

Guidelines will be helpful for schools that are preparing to reopen, but it will be necessary for schools to contextualize the guidelines to their specific circumstances. It is likely that schools will encounter logistical challenges in operationalizing many recommendations—in particular, as they relate to ensuring physical distancing between students, especially young students. A selection of guidance documents includes:

- American Federation of Teachers, Plan to Safely Reopen America's Schools and Communities
- UNICEF, WHO, IFRC, Key Messages and Actions for COVID-19 Prevention and Control in Schools
- UNESCO, UNICEF, the World Bank, the World Food Programme, Framework for Reopening Schools
- WHO, Considerations for School-Related Public Health Measures in the Context of COVID-19
- CDC, Interim Guidance for Administrators of US K-12 Schools and Child Care Programs
- CDC, Interim Guidance for Child Care Programs [draft, unofficial release]

- National Association of Independent Schools, Coronavirus (COVID-19) Guidance for Schools

Emerging Approaches to School Openings and Closures

A patchwork of approaches and timetables is evident when looking across countries and state plans for resuming classroom-based education. Strategies from 11 countries have been reviewed and summarized in this report's Appendix in order to display variations in the landscape of school-related national policies. It should be noted that the examples provided below and in the Appendix do not cover all countries or all mitigation measures planned or under consideration. While 11 countries does not constitute a definitive sample size to fully document the scope of all educational policies and practices currently being used during the COVID-19 pandemic, it provides an overview of different measures being taken. While success in mitigating community transmission cannot be ascribed to any of these school approaches yet, it will be important to monitor the effectiveness of these and other policies from countries that could be translated to the US education landscape.

Remote and Blended Learning

Throughout the pandemic, a vast majority of countries and areas have restricted classes to an online, remote format in one way or another. In Australia, the Australian Capital Territory is teaching all classes remotely from late April through at least early July. France and New South Wales in Australia were also continuing remote learning until mid-May. Singapore has conducted classes remotely for all schools since early April through at least early May. South Korea has conducted classes remotely since April. Some schools in Sweden remain open, while others are only conducting learning remotely, depending on municipality or school discretion.

Certain countries and areas are using both remote and in-person methods for students in a blended learning approach. For example, New South Wales in Australia is using a phased approach to return to in-person classes. Students have begun attending in-person classes on 1 assigned day per week since mid-May, with a preference given to students in the same household attending on the same day. As control of the outbreak improves in the future, students will attend an additional day per week until finally transitioning fully back to all in-person classes. The Netherlands has also begun using a phased blended learning approach, in which primary school students will attend in-person classes for half the week and use remote learning the other half of the week starting in mid-May.

In-Person Classes for Select Groups

Some countries and areas are conducting the majority of classes online, with a select group of individuals being allowed to learn in person at school. In Australia, Queensland is allowing only vulnerable students and children of essential workers to attend in-person classes during its second term, which runs through late May. The United Kingdom has followed a similar policy since late April. Since April, Victoria in

Australia has allowed vulnerable students, some students requiring in-person learning in order to graduate, and children of guardians who cannot make other arrangements to attend in-person classes. Denmark allowed autism spectrum disorder classes and classes of particular age groups to resume in mid-April prior to in-person classes resuming for all students in early May. The Netherlands has a similar policy that allows special education students to attend in-person classes for the entire week, while other students must continue blended or remote learning until early June.

In-Person Classes and Activities for Particular Age Groups

Some countries are beginning the process of reopening their schools by specifically only allowing students in particular age ranges to attend in-person classes, while other age groups are still required to learn remotely. Some countries promote older children learning in person, due to exam or graduation requirements, while other countries have decided to start with younger children learning in person. For example, in mid-April Denmark gradually resumed in-person classes with primary school students, some secondary students, and final year vocational students, while other secondary school students remained remote until early May. Starting in mid-May, France has allowed primary and middle school students to return to in-person classes on a voluntary basis, while high school students cannot return to in-person classes until at least late May and only after districts are considered largely free of transmission. Starting in late April, certain states in Germany provided in-person classes only for older students preparing for exams. In Iceland, students from preschool age until age 16 have been attending classes in person since mid-March, while older students continued remote learning until early May. In the Netherlands, primary schools began conducting blended classes with in-person and remote components, while secondary school students will continue remote learning until early June, with the exceptions of students who must sit for final exams in person. In late May, Tasmania in Australia will allow all K-12 students, except for years 7 through 10, to return to in-person classes.

Daycare, Early Childhood Services, After Care, and Child Supervision Services

Some countries are ensuring continued access to services that supervise children, such as daycare, after care, or other early childhood services. However, countries differ in who is allowed access to these services. Australia has strongly encouraged all daycare centers and early childhood services to remain open, even providing additional funding, and Iceland preschools have been open since mid-March. Other countries, including Denmark, the Netherlands, Sweden (preschool only), and France, are also beginning to reopen daycare facilities or daytime child supervision services with various levels of mitigation measures. Some countries, such as the Netherlands, are providing additional services, such as before-school care and after-school care.

In contrast, Germany has a policy of providing emergency childcare for children of hospital workers and police, with other daycare services being closed. Sweden provides daycare for children of guardians in certain essential professions. South Korea provides

emergency childcare with mitigation measures in place for certain early childhood and primary school students. Similarly, before-school care and after-school care specifically for vulnerable children or children of essential workers has continued to be available in the United Kingdom. Other areas, such as New South Wales in Australia, have a "no child turned away" policy so that any child can be supervised who needs it during the school day, regardless of age. Some countries such as Singapore have suspended daycare and other child supervision services entirely.

Universal In-Person Classes with a Remote Opt-Out Option

Some countries and areas are already transitioning to in-person classes but allowing guardians or children to opt out if they chose and to learn remotely. Western Australia, South Australia, and Northern Territory in Australia are currently following this strategy. Some schools in Sweden are using remote learning at the discretion of municipality and school officials.

Considerations for Vulnerable Populations

Countries have also recognized that certain vulnerable populations require additional special measures or considerations. Below is a sampling of some of these measures and considerations.

- **Who is considered vulnerable?** Countries have varying definitions of students they would consider vulnerable, and they have differing mechanisms by which individual students are classified as vulnerable and able to receive additional protections or accommodations. Some countries or areas make provisions for students on a case-by-case basis, as determined by educators or school officials. Other countries or areas have defined groups of students who are automatically considered vulnerable. See Appendix for examples of defined groups considered vulnerable by various countries.
- **In-person classes.** Some countries specifically provide in-person classes for vulnerable students.
- **In-person supervision.** Some countries specifically allow for in-person supervision for vulnerable students.
- **Continuation of existing services and protections.** Some countries have worked to ensure that services or protections normally available to vulnerable children continue, including processes to protect children from abuse or domestic violence as well as services typically provided to children with disabilities or lunch for students from low-income families.
- **Ensuring access to remote learning materials.** Some countries are adding provisions for students who are engaging in remote learning but lack devices or sufficient internet access. Some measures taken include providing devices or providing alternative hard copy materials to students who need them.

Considerations for High-Risk Populations (adults and children)

Some countries are enacting specific policies to protect students, teachers, staff, and household members of students who are at a higher risk of severe disease or death if infected by SARS-CoV-2. Below are examples of policies currently used by various countries related to accommodations and protections for these individuals.

- **Defining high-risk status.** Some countries have specific definitions of high-risk groups, while other definitions are more flexible or require only self-identification in order to receive accommodations. Some also use a combination of definitions. For example, in Australia high-risk status is inclusive of individuals over the age of 70; individuals over the age of 65 who have a chronic medical condition; individuals over the age of 50 who are aboriginal and have a chronic medical condition; and individuals with a compromised immune system. However, individual states and territories in Australia also allow for individuals to self-identify as high risk and discuss potential accommodations with school leaders in consultation with their medical care providers and other stakeholders on a case-by-case basis.
- **Accommodations for students.** Some countries allow, encourage, or mandate various accommodations and protections for students at high risk of severe disease or death. One measure of protection is the option of remote learning. Some countries are allowing students to opt out of in-person classes and learn remotely even if they do not identify as belonging to a high-risk group.
- **Accommodations for teachers and staff.** Countries may allow, encourage, or mandate work accommodations for school teachers and staff. For example, Australia encourages staff and teachers to discuss potential work from home or other accommodations with school principals. France specifies that teachers considered to be at high risk are allowed to work from home.

Mitigation Measures for In-Person Interactions

Countries adopting any in-person component to coursework or supervision of children are often also adopting various measures in an effort to reduce viral transmission within schools and their associated communities. Examples of mitigation measures used are listed below. (See the Appendix for greater detail on specific country measures.)

- **Physical distancing.** Countries are introducing various measures to encourage or maintain physical distancing among students and staff. Approaches range from the promotion of distancing behavior to strict enforcement of distancing. Some countries require modification of classroom furniture arrangements. Others promote the use of electronic submission and feedback on assignments to avoid exchanging hard copies of schoolwork. Countries have also maintained strict teacher:student ratios to ensure physical distancing is maintained in classrooms.
- **Reducing the number of potential contacts.** Some areas have taken measures that may assist in reducing the number of potential contacts of students. These measures include canceling student gatherings such as sporting events and

assemblies, minimizing class sizes, reducing queueing, and canceling after-school activities including extracurricular activities and sports. Schools in some countries have also closed common areas where students may congregate, promoted walking or biking to school instead of using public transportation, or allowed only take-out from school cafeterias.

- **Avoiding mixing between groups.** Some countries provide measures that place an emphasis on keeping individuals from different groups separate. This includes strategies to keep the public away from students, to keep different age groups of students apart, to keep students and adults separate, or to keep classroom groups or students of different schools separate. Measures to implement these strategies include canceling student field trips or excursions, canceling interschool gatherings, reducing public access to school grounds, and staggering times between class transitions.
- **Increasing ventilation.** Some countries advocate for classes or activities being conducted in outdoor spaces or in classrooms with open windows when possible.
- **Enhancing hygiene and cleaning.** Several countries are using measures to enhance hygiene and cleaning and reduce possible transmission of the virus on surfaces. These measures have included promoting handwashing, supplying hygiene products, supplying additional rubbish bins, disposing of waste frequently, and reducing mobile phone use in school settings. Measures also include frequent cleaning, particularly of high-touch surfaces such as playground equipment and toys.
- **Reducing access to high-touch surfaces.** Various countries are employing policies to reduce access to high-touch surfaces, such as closing playgrounds or communal water fountains, to reduce transmission of the virus on surfaces. Additional measures used include closing school swimming pools or not allowing children to share toys or equipment they touch with bare hands.
- **Identifying and isolating symptomatic students and staff.** Some countries are taking extra steps to identify sick students early to keep them from transmitting to others. Measures include monitoring the health of staff and students throughout the day visually or through temperature checks. Mandatory regular diagnostic testing for students is also being piloted in 1 country.
- **Promoting influenza vaccination**. Some countries are promoting seasonal influenza vaccination among guardians, staff, and students to avoid the potential for co-infection.
- **Using personal protective equipment.** Countries have differing guidance on the use of personal protective equipment by staff and students. Some countries generally advise against mask use, while others specifically require secondary school students and staff to wear masks if learning in person. Others recommend gloves for physical care of children, such as first aid activities or care of children affected by physical disabilities.

- **Varying mitigation for different age groups.** Not all countries apply mitigation measures equally across age groups. For example, Iceland requires older students in noncompulsory education to use stricter physical distancing and classroom size measures than their younger counterparts in compulsory education. The Netherlands also specified strict physical distancing between students aged 13 to 18 for outdoor activities but did not specify the same strict physical distancing between younger students engaged in outdoor activities.

Applications and Next Steps

While 11 countries is not a large enough sample size to allow us to fully understand the scope of all educational policies and practices currently being used during the COVID-19 pandemic, these countries illustrate many of the priorities and measures being taken. Within-country variation in how these policies are implemented may provide important lessons. Within this small sample may be examples of policies that states in the United States should consider when deciding on how to reopen schools. Factors to consider before enacting any of the above measures should include similarities and differences between populations, unique considerations for vulnerable or high-risk groups, differences in culture and education needs, and the overall success of the communities at mitigating community transmission as they reopen. It is also important to consider the potential success of country approaches in context. For instance, holding in-person classes may largely be successful in some regions because of factors outside of the education system, such as how well the country has responded to its COVID-19 outbreak thus far and the associated severity and scope of the outbreak at the time of reopening.

It is conceivable, if not likely, that many schools that attempt to implement mitigation measures (eg, maintaining social distance between students and between teachers and students) will struggle from operational, logistics, and funding perspectives. While implementing public health–informed measures to protect students, their families, and school teachers and staff is crucial, school districts will also have to think strategically about how to ensure adequate staffing in schools, especially given teacher shortages in some parts of the United States (with an overall shortage of approximately 100,000 teachers) as well as the potential for 300,000 possible teacher layoffs in the fall. School nurse shortages may further hamper implementation challenges.

Recommendations for Research Needed to Inform Decision Making About School Reopening

It has been well established that children are less likely than adults to develop severe illness from COVID-19, but it is not clear what role they play in transmission. While the scientific evidence to date suggests that children do not play as dominant a role in SARS-CoV-2 transmission as they do in seasonal influenza, there are still many important open questions. How efficiently and frequently do children who are asymptomatic or mildly symptomatic spread the virus to other children? To adults in the school? To family members at home? Since adults are at greater risk of severe illness and death than children, the possibility of asymptomatic spread from children to adults poses a risk to guardians and adult family members, school staff, and other caretakers. This risk may be even greater for adults who are considered high risk for severe disease. Approximately 527,000 teachers who teach preschool through grade 12 in the United States are over the age of 61, and that figure does not include other potentially high-risk staff and volunteers who work in childcare settings and schools.

Studies are getting off the ground to begin to provide answers to some unanswered scientific research questions. For instance, Boston Children's Hospital has launched a study of COVID-19 disease among children across the country, with funding from CDC. According to press reports, the study will include 35 children's hospitals and capture data from 800 patients hospitalized with COVID-19. The investigators plan to enroll up to 400 of these patients for detailed, prospective observation and periodic collection of samples. Data on patients' antibody levels and viral shedding, among other indicators, will be collected. One of the goals of the study is to ascertain why some children become seriously ill with COVID-19.

Another example is an NIH study recently launched to help determine the rate of coronavirus infection in children and their family members in the United States. The study, called Human Epidemiology and Response to SARS-CoV-2 (HEROS), aims to determine what percentage of American children who are infected with SARS-CoV-2 develop symptoms. In addition, the study will examine whether rates of SARS-CoV-2 infection are higher in children who have asthma or other allergic conditions. The study team is enrolling 6,000 individuals from 2,000 US families.

More can and should be done on an expedited basis to better understand the level of risk to families, teachers, and students when classroom-based instruction resumes and to inform planning as schools contemplate how to reopen. We recommend the following:

1. Conduct epidemiologic investigations

Studies to reconstruct transmission chains using data collected from contact tracing and case investigations are needed to help pinpoint whether children are a frequent source of infection or whether they rarely transmit. These studies, which could be conducted by state and local health departments, could be based on methodologies used for studying household transmission of influenza. It would be most useful if such studies were conducted in settings where children are not primarily remaining at home—for example, in US states that have reopened this spring, other countries that have reopened schools recently, or in daycare facilities that remain open to serve the children of essential workers. If these studies determine that children are often a source of infection, either for other children or for adults, this would suggest that children are an important driver of infection, as is the case with influenza. If children are found to rarely be the index case, that would point to a safer reopening.

Serological studies looking for past evidence of infection would also be helpful to characterize the burden of COVID-19 in children, teachers, and other school staff. These studies should be performed in settings where school has reopened already, and studies should be planned for the future when larger numbers of schools are likely to be reopened. In the latter case, these studies should still be organized and prepared to start now, so that they can be conducted in the immediate months following reopening of schools. Data from schools that are reopening now or that have reopened recently could be used to inform decisions about reopening this summer or fall. Collecting data this fall will be too late to affect fall reopening decisions, but it would still facilitate a better understanding of transmission risks of COVID-19 in the school setting, which could inform future policymaking.

2. Undertake case studies and cohort studies

Although published case series suggest that it is primarily infants and children with underlying health conditions who develop severe disease, more information is needed on risk factors for children. If mild health conditions (eg, well-controlled asthma, repaired or low-complexity congenital heart defects) are associated with severe disease in children, the risk assessment for reopening schools will be different than if it is primarily medically fragile children who are experiencing severe COVID-19 infection.

Likewise, it is critical to better understand the role of comorbidities in COVID-19–positive adults who suffer severe outcomes. This line of scientific inquiry is especially important for families with school-age children who live with 1 or more adult family members who suffer from an underlying health condition that makes them more vulnerable to severe outcomes of COVID-19. The US CDC cautions that children can pass the virus on to others who may be at a higher risk of negative outcomes and recommends that children be separated in the household from

other individuals who have a high risk of severe illness from COVID-19. This recommendation is likely difficult, if not impossible, to follow, especially in high poverty and multigenerational households, so more data are needed to better ascertain the risk of children transmitting the virus to adults in the household. The pathogenesis of SARS-CoV-2 in young children is not well understood. Clinical studies could explore whether children have specific immune-regulatory mechanisms that contribute to milder disease, whether past infections with other types of coronaviruses that circulate among young age groups may confer some level of protection against COVID-19, or whether there is some other explanation(s) for the differences from adults. We should seek to understand whether there are any physiological reasons why children are so infrequently reported among cases and severe illness.

In addition, studies assessing viral load in infected children and the relationship between viral load and transmission may also be helpful in understanding the role children play in transmission—particularly those with mild and asymptomatic infection.

3. Evaluate effectiveness of policies

As schools adopt and follow various guidelines and bring students back to classrooms, we should be closely evaluating the effectiveness and outcomes of different approaches. Studies can estimate the effects of various policy approaches, using strong nonexperimental designs. These might include rigorous comparison group designs, which aim to compare groups that were or were not exposed to some policy but that were as similar as possible on a large set of background characteristics. For policy evaluation, a common strategy is to use both a comparison group and longitudinal data on key outcomes before and after the policy change, known as a difference-in-differences approach.

With data on policy implementation dates, localities that implement different policies can be compared across time to examine whether the policy implementation was associated with changes in disease transmission or other outcomes in the community; they can also be compared to trends over time in locations that did not change their policies. These studies will be challenging, given the multitude of factors influencing disease transmission, but carefully done studies may be able to tease apart the different factors, using statistical and econometric models, as is being done for some examinations of stay-at-home policies.

4. Conduct surveillance and epidemiologic studies specific to daycare

The United States and many other countries, although they have closed schools, have sustained childcare services to some extent throughout the pandemic. It would therefore be greatly advantageous to conduct disease surveillance and epidemiologic studies specifically with childcare facilities in mind. Surveillance systems and contact tracing efforts should include queries about any connections of infected individuals to childcare providers. These data can help identify and flag clusters of disease that are related to childcare facilities if they are occurring.

Childcare centers, as compared to elementary schools, generally have fewer children, as they are governed by state childcare licensing ratios. That being said, childcare for infants, toddlers, and preschool-aged children is characterized by close contact between children and childcare providers, with frequent exposure to respiratory droplets and other bodily fluids. One daycare center in Quebec reported a COVID-19 outbreak in 4 of its staff and 12 of the 27 children. Children of these ages are unable to observe physical distancing measures or maintain personal hygiene or mask wearing with any consistency. So, if surveillance and epidemiologic studies show that transmission is not occurring at high rates in these facilities, it would usefully inform policies and could serve to incentivize closed facilities to reopen.

5. Perform studies to assess psychosocial impacts to increase chances for successful reentry into school

The continued presence of contagion reasonably dictates that priority be given to the physical health of schoolchildren and staff. At the same time, for students to resume their studies successfully, more research is needed on the psychosocial, developmental, and psychological impacts of COVID-19 on children and adolescents. An ad hoc research response, with small-scale and localized initiatives, will not produce the kind of insights that decision makers, educators, and guardians require so that school-age children can have the conditions they need to learn effectively. The pandemic is occurring at a time of rising mental health issues in adolescence and childhood. Thus, schools need to be doubly prepared to reopen and to serve their charges well.

An immediate priority is the collection of high-quality data on the mental health and psychological effects of the pandemic for school-age children. Among the stresses that may be prompted by the novel coronavirus are an interrupted education, exposure to substance misuse, domestic violence and child abuse, food insecurity, overcrowded accommodations, economically displaced guardians, disrupted social networks and social isolation, and, for some, bereavement. Of urgent concern are identifying and mitigating the effects of school closures on

youth with mental health needs, because education settings are where children and adolescents often seek out help. A majority of mental health disorders emerge in childhood and adolescence, making it critical to identify and treat concerns early. School closures, too, may disrupt the provision of mental health care for some youth more than others. Adolescents in racial and ethnic minority groups, with lower family income, or with public health insurance rely disproportionately on school settings for mental health services.

More research into the pandemic's effects on educational outcomes of children from different population groups is needed. The gap in math and reading skills between children from lower and higher socioeconomic backgrounds often widens during school holiday periods; with unequal home learning environments, school closures may similarly expand the learning gap. Research, too, into factors that strengthen the capacity of children and adolescents to overcome pandemic-induced distress and to demonstrate resilience could prove useful when school staff welcome returning students.

6. Establish a national advisory group to synthesize study results and make evidence-based recommendations

The US government should support the establishment of a national advisory group to regularly review the state of scientific research as it relates to the reopening of schools. The advisory group should provide regular status updates on research aimed at addressing key scientific questions and, as appropriate, issue recommendations supported by the data. The group should include pediatric, public health, and educational researchers, as well as parents, teachers, and clinicians. The National Academies of Sciences, Engineering, and Medicine would be well positioned to convene this advisory group and issue periodic reports. As additional research studies commence and all eyes are on the fall, updates on existing and emerging evidence will help to inform risk assessments and decisions pertaining to schools reopening.

Conclusion

Determining the risk of infection in school for children and discerning whether children infected with COVID-19 can efficiently transmit the virus to others (especially high-risk adults) must be prioritized. Sending children back to learn in classrooms in the fall would greatly benefit them from educational, mental health, social development, and general well-being perspectives. It would also free up their adult caregivers who need to return to work, whether inside or outside of the home. Funding and immediately pursuing the research described above will assist families, schools, and political leaders to make better-informed choices about reopening schools. What we need now is reliable information and rigorously designed studies that could lead to more peace of mind about sending our children back to learn and thrive in schools. This research should be funded and begun as soon as possible so that preliminary data can be available before the start of the fall school year. Research should continue after schools open to answer these important questions about the role of children in transmission of COVID-19.

Appendix: Existing approaches used by other selected countries

The appendix describes overarching school-related policies used by 11 selected countries. This is not a comprehensive analysis of all existing education policies to mitigate COVID-19 transmission, but rather a selection of varying approaches by a subset of countries. Success in mitigating transmission is not being ascribed to any of these measures at this time, but these approaches should be evaluated and considered in future research in order to better inform the upcoming fall school year in the United States.

Australia

Summary	Reopening and closing of schools varies significantly by state/territory, including the use of remote learning, in-person classes, in-person classes for select groups, in-person classes for particular age groups, and blended learning. Those that do reopen often use national guidance to mitigate risks of transmission. Considerations are also included to maintain services for vulnerable students and protect high-risk individuals.
Decision-making & policy implementation	"State and Territory Governments and non-government sector authorities are responsible for managing and making operational decisions for their schools. Decisions regarding the response to COVID-19 in the schooling sector must continue to be informed by expert, official, national and state-based public health and education advice, consistent with [COVID-19 National Principles for School Education]."
Use of in-person classes and remote learning	• **Victoria**: Starting on April 14, in-person classes have been conducted for select groups, with remote learning for all other students. Select groups include vulnerable students, children of guardians who cannot make other arrangements, and some students in years 11 and 12. • **Queensland**: Starting on April 20, in-person classes have been conducted for select groups, with remote learning for all other students through at least May 22. Select groups include children of guardians who are essential workers and vulnerable students. • **New South Wales**: Previously, students were allowed to attend in-person classes, but remote learning was strongly encouraged. Starting on April 29, classes were conducted remotely until May 11. Starting May 11, students have engaged in blended learning, attending classes in person for part of the week and learning remotely for the rest of the week. Students will start with learning in person 1 day per week with additional in-person learning days per week added over time, depending on COVID-19 outbreak control in the area. • **Western Australia**: Previously, students were allowed to attend in-person classes, but remote learning was strongly encouraged. Starting April 28, students could continue to attend classes in person, with an opt-out option for those who prefer to continue learning remotely. • **South Australia**: Starting April 27, classes have been conducted in person with an opt-out option for those who prefer to continue learning remotely. • **Tasmania**: Children are currently learning remotely. Starting May 25, kindergarten to year 6 students, as well as year 11 and year 12 students, will attend in-person classes, while students in years 7 through 10 will continue to learn at home. Beginning on June 9, students in years 7 through 10 will return to in-person classes. • **Australian Capital Territory**: Previously, in-person classes were used. Starting April 27, classes have been conducted remotely for all students. • **Northern Territory**: Starting April 20, classes have been conducted in person, with an opt-out option for those who prefer to continue learning remotely.
Child supervision services such as daycare & after school care	Strongly encouraged to remain open, additional funding for providers available through at least June 28.
Mitigation measures: physical distancing	Physical distancing strongly encouraged but not strictly enforced when impractical. Emphasis on distancing between adults, such as restricting community access to school grounds. Maintain strict teacher-to-student ratios, such as the 1-to-8 ratio Victoria uses. Environmental modifications such as closing common areas, avoiding queueing, and modifying furniture arrangements may be done to promote distancing. School cafeterias may allow only takeout. Physical distancing promotion

	overall may be modified by age range. Consider using electronic options for submission and feedback of assignments.
Mitigation: reducing the number of potential contacts	Gatherings including after school extracurricular activities or sports may not be allowed. Class size should be minimized. School swimming pools may be closed.
Mitigation: avoid mixing between groups	Individuals from outside the school may be restricted from school grounds or gatherings. Students and staff should not go on field trips or excursions. Transition times should be staggered so classes of different years do not mix.
Mitigation: increased ventilation	Conduct activities outdoors. Conduct activities in large, enclosed spaces such as gymnasiums. Open windows during instruction.
Mitigation: enhanced hygiene and cleaning	Cleaning and handwashing supply products and rubbish bins should be provided. Cleaning should be done frequently, particularly for high-contact surfaces. Waste should be disposed of frequently. Handwashing and hygienic behavior should be promoted. Communal water fountains may be closed. Mobile phone use should be discouraged.
Mitigation: reduce access to high touch surfaces	Playgrounds and other high-touch equipment may be closed. Group separation may also be used on playgrounds.
Mitigation: identify and isolate symptomatic students and staff	Do not allow symptomatic students or staff to participate in in-person classes or activities. Monitor for potential symptoms in students and staff throughout the day, particularly at daycare centers and early childhood facilities. Large-scale temperature checks are discouraged due to limited evidence of efficacy. Individual schools may be closed if an outbreak in the school warrants the measure.
Mitigation: personal protective equipment	Masks are not needed, but gloves should still be used when giving direct physical care of children, such as during first aid.
Mitigation: other	Promote vaccination for seasonal influenza among students, staff, and parents.
Considerations for vulnerable students	• **Defining vulnerability**: Varies state by state, but generally includes certain defined groups with latitude by schools to include other students they identify. In New South Wales, these defined groups include those affected by disability, children with high support needs, children who are in residential care, students who are young carers, students at risk for significant harm, students who are homeless, students of families supported by social and family support programs, and students affected by domestic violence. In Queensland, these groups include children identified by schools or who are currently receiving services from Child Safety, including children who are subject to a child protection order or are subject to a youth justice order and children in designated indigenous communities. In Victoria, these groups include any children in out-of-home care, children deemed by Child Protection and/or Family Services to be at risk of harm, children identified by the school as vulnerable (including via referral from a family violence agency, homelessness, or youth justice service or mental health or other health service, and children with a disability).
Considerations for vulnerable students	• **In-person classes** for vulnerable students in certain states • **In-person supervision** of vulnerable students in certain states, including daycare, after care, before school care, or other similar services • **Continuation of existing services and protections** for students affected by domestic violence, students with disabilities, or other vulnerable students • **Ensuring access to remote learning materials**: Schools may provide devices or hard copy learning materials to students who lack access to remote learning, if needed.

Considerations for high risk populations	Note: Measures listed are inclusive of all reported by states and territories, but not all measures are necessarily used in each state and territory. • **Defining high-risk individuals**: 70+, 65+ with chronic condition, 50+ and Aboriginal with chronic condition, those with a compromised immune system • **Accommodations for students**: Guardians, medical providers, and principals should identify best precautionary actions, including remote learning. • **Accommodations for teachers and staff**: Staff and school principals should work out arrangements, such as potential work from home.
Notes	• **Mitigation measures** listed are inclusive of all reported by states and territories, but not all measures are necessarily used in each state and territory. • **Funding**: The national government is providing assistance of up to $100,000 to help eligible small and medium-sized businesses and for-profit organizations, including nongovernment schools. • **Testing**: Specific guidance on April 7 states that students can earn their high school diploma this year in order to allow for university admission/employment, and related assessments will be available and altered if needed to accommodate COVID-19. On March 20 it was announced that in-person standardized testing for literacy and other basic skills (NAPLAN) scheduled for May would not be occurring this year. • **International students**: On February 22, it was announced that Chinese-based students were allowed to attend their final 2years of high school in Australia as an exemption to travel restrictions. • **Interesting note on transmission**: April 25 AHPPC guidance states, "the greatest risk of transmission in the school environment is between adults." • **Communications**: April 25 AHPPC guidance promotes use of newsletters, social media, SMS, TVs, posters, factsheets, and web links for schools to raise awareness with guardians and children • **Boarding schools** residential facilities in certain states and territories are closed. • Western Australia on reopening schools: "We have considered the benefits of schools remaining open over the last 2 months and, in the context of our wider public health strategies, determined schools should stay open and that they are safe for staff and students. With increased testing and low rates of infection in Western Australia, I am confident that school staff and children are not at an increased risk of COVID-19 by physically attending school. Even when we had higher rates of disease in WA, only 1.5% of cases were in school students (8 cases) and one case was in a teacher, which were mostly related to travel, all of whom had mild illness and have fully recovered. Furthermore, there have been no cases of student-to-student transmission in WA and no cases of student-to-teacher transmission. Other Australian jurisdictions have had similar experiences. In reviews of cases in South Australia and New South Wales, there has been only one case of student to student spread and no student to teacher spread. Adult staff (teachers) appear to play a role in both the introduction and, to a greater extent than children, transmission of the virus in educational settings, which is why social distancing among adults remains important. There remains no good international evidence of significant transmission between children, or between children and teachers, in schools. The downside of keeping schools closed is the potential to significantly adversely impact the cognitive, psychological and physical development of children."

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Denmark

Summary	Reopening is slowly occurring at the national level, with younger students, some vulnerable students, and last-year students coming back first. Mitigation measures strongly focus on hygiene, distancing, and reduction of potential contacts.
Decision-making & policy implementation	Decision making on reopening has been made mostly at the national level, with districts having flexibility to make some local decisions on reopenings as well.
Use of in-person classes and remote learning	Schools have been closed since March 12. Some districts have been gradually reopening schools since April 15, starting with elementary (K-5th grade), secondary (2nd-3rd grade), final-year vocational students, and autism spectrum disorder classes. All other students will remain in remote learning until May 10.
Child supervision services such as daycare & after school care	Daycare facilities are reopening beginning April 15.
Mitigation measures: physical distancing	Physical distancing has been implemented.
Mitigation: reducing the number of potential contacts	Classroom size is limited to 10 students per classroom. Large gatherings and events are banned until at least August. Smaller gatherings of more than 10 people will remain banned until May 10. Common spaces, such as club premises and libraries, will be closed through at least May 10.
Mitigation: avoid mixing between groups	No further information identified
Mitigation: increased ventilation	No further information identified
Mitigation: enhanced hygiene and cleaning	Hygiene rules have been implemented, with handwashing promoted throughout the day. Signage and handwashing-hand sanitizer stations will be available. Schools must have a hygiene plan in place prior to opening in-person classes.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	No further information identified
Mitigation: personal protective equipment	Mask use is not recommended at this time.
Mitigation: other	See National Board of Health guide for administrators, staff, and pupils for management
Considerations for vulnerable students	Continuation of existing services is a priority. Ministry of Social Affairs and the Interior efforts remain open to serve those with disabilities, the homeless, other vulnerable populations. Housing assistance, social educational assistance, and professional help are also being coordinated. There is a coordinated effort with Ministry of Children and Education for youth concerns.
Considerations for high risk populations	Written guidance is in development
Notes	No further information identified

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France

Summary	Reopening has begun in mid-May with younger students returning to in-person classes first. Mitigation measures include reduction of potential contacts, hygiene, and mask usage.
Decision-making & policy implementation	Decisions on reopening have been made mostly at the national level, with districts having flexibility to make some local decisions on reopenings as well.
Use of in-person classes and remote learning	Remote learning will continue until at least May 11. Elementary and middle school will resume in-person classes on May 11. High school will not resume in-person classes until at least May 18 and will be allowed only in districts considered "green" or largely free of transmission. Decisions on when high schools will open will be made by the end of May. Students are also allowed to opt-out of in-person classes and continue remote learning.
Child supervision services such as daycare & after school care	Nurseries will open May 11 with classroom size restricted to 10 or fewer.
Mitigation measures: physical distancing	No further information identified
Mitigation: reducing the number of potential contacts	Classroom size is limited to 15 students per classroom.
Mitigation: avoid mixing between groups	No further information identified
Mitigation: increased ventilation	No further information identified
Mitigation: enhanced hygiene and cleaning	Hand sanitizer gel will be distributed to students and staff.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	No further information identified
Mitigation: personal protective equipment	Secondary school students and all staff are required to wear masks.
Mitigation: other	No further information identified
Considerations for vulnerable students	No further information identified
Considerations for high risk populations	Teachers who are considered high risk are allowed to remain working from home.
Notes	No further information identified

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Germany

Summary	Reopening plans are still being finalized, with prioritization of graduating students. Some older students are attending in-person classes. Emergency childcare for essential workers is currently being provided.
Decision-making & policy implementation	Decisions on reopening have been made mostly at the national level, with districts having flexibility to make some local decisions on reopenings as well.
Use of in-person classes and remote learning	Since April 24, some in-person classes have been open for older students preparing for exams in certain states, but overall remote learning is still occurring. Overall reopening plans are still being finalized, with prioritization of graduating students.
Child supervision services such as daycare & after school care	Most daycare facilities are closed, except for emergency child care being provided for children of hospital workers and police.
Mitigation measures: physical distancing	No further information identified
Mitigation: reducing the number of potential contacts	No further information identified
Mitigation: avoid mixing between groups	No further information identified
Mitigation: increased ventilation	No further information identified
Mitigation: enhanced hygiene and cleaning	No further information identified
Mitigation: reduce access to high touch surfaces	Note: Playgrounds are being reopened, date TBD.
Mitigation: identify and isolate symptomatic students and staff	One school in northern Germany is also piloting a testing program in which students must collect a sample for testing. If a student tests positive, he or she must stay home for 2 weeks. If the test is negative, the student receives a green sticker that allows travel throughout the school.
Mitigation: personal protective equipment	No further information identified
Mitigation: other	No further information identified
Considerations for vulnerable students	No further information identified
Considerations for high risk populations	No further information identified
Notes	No further information identified

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Iceland

Summary	Classes are operating in person, with younger students allowed to do in-person learning first. Mitigation measures focus on physical distancing, reduction of potential contacts, hygiene ,and reducing mixing between groups. Some after-school activities are allowed with mitigation.
Decision-making & policy implementation	Decisions regarding opening and closing of schools are occurring at the national level.
Use of in-person classes and remote learning	Majority of schooling is occurring in person, with some classes for certain age groups still occurring remotely. All preschools and compulsory education has been operating in-person classes since March 13, with mitigation measures in place, and will be allowed to operate normally starting May 4 (uncertain if this means with or without mitigation). Noncompulsory education will continue remotely until May 4, when in-person classes will resume with mitigation.
Child supervision services such as daycare & after school care	Preschools have been open with mitigation measures since March 13, and starting May 4 will be open normally (uncertain if that means with or without mitigation).
Mitigation measures: physical distancing	Two-meter social distancing in place for noncompulsory education students and outdoor sports starting May 4. Preschool students should stay as separate as possible from other groups. If children are mature enough to obey instructions on reduced contact with friends, then they can play together without physical touching or sharing toys/equipment that they touch with bare hands.
Mitigation: reducing the number of potential contacts	Minimization of classroom size: small groups only for preschool, 20 students per classroom for compulsory education, and 50-student limit for noncompulsory education and outdoor sports, starting May 4.
Mitigation: avoid mixing between groups	Groups and classrooms must avoid mixing.
Mitigation: increased ventilation	Starting May 4, outdoor sports are allowed.
Mitigation: enhanced hygiene and cleaning	Cleaning should occur at least daily for the building. Handwashing should be promoted, particularly after activities with other students.
Mitigation: reduce access to high touch surfaces	If children are mature enough to obey instructions on reduced contact with friends, then they can play together without physical touching or sharing toys/equipment that they touch with bare hands.
Mitigation: identify and isolate symptomatic students and staff	No further information identified
Mitigation: personal protective equipment	No further information identified
Mitigation: other	No further information identified
Considerations for vulnerable students	No further information identified
Considerations for high risk populations	No further information identified

Notes	Specific to households with some members under quarantine: If the children are mature enough to maintain hygiene and social distancing, they are allowed to attend school. The entire household must quarantine if any child in the partially quarantined house cannot maintain quarantine instructions.

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Netherlands

Summary	Blended learning is being used for primary school students beginning May 11. In-person classes are allowed for students who attend special education classes. Secondary school students are using remote learning until at least June 1.
Decision-making & policy implementation	Decisions regarding opening and closing of schools are being made at the national level.
Use of in-person classes and remote learning	Primary school students will attend blended classes beginning May 11, with 50% of time dedicated to in-person classes and 50% of time dedicated to remote learning. Secondary students will use only remote learning until at least June 1. However, secondary schools may reopen for students to sit final exams.
Child supervision services such as daycare & after school care	Daycare facilities will reopen on May 11. Daycare centers and childminders for ages 0-12 will open with their regular hours, but after-care supervision is allowed only on days when students attend school.
Mitigation measures: physical distancing	Physical distancing of 1.5 meters between students must be maintained in classes. Outdoor activities such as sports have been allowed from April 29; children between the ages of 13 and 18 must stay 1.5 meters apart.
Mitigation: reducing the number of potential contacts	School occupancy is reduced, with blended learning. Guardians are asked to walk or bike their students to school whenever possible to avoid public transportation. Outdoor activities such as sports have been allowed from April 29, but matches and competitions will not be allowed.
Mitigation: avoid mixing between groups	No further information identified
Mitigation: increased ventilation	Outdoor activities such as sports have been allowed from April 29. Matches and competitions will not be allowed. Children between the ages of 13 and 18 must stay 1.5 meters apart.
Mitigation: enhanced hygiene and cleaning	Handwashing, cough etiquette, and other hygienic behavior is being promoted.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	No further information identified
Mitigation: personal protective equipment	No further information identified
Mitigation: other	No further information identified
Considerations for vulnerable students	Primary students who attend special education classes may attend in-person classes every day.
Considerations for high risk populations	No further information identified
Notes	No further information identified

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Singapore

Summary	While initially Singapore kept schools and in-person classes open during the outbreak, as of April 8, all classes have been moved to remote learning.
Decision-making & policy implementation	Decisions regarding opening and closing of schools are being made at the national level.
Use of in-person classes and remote learning	There was a countrywide school closure on April 3, and all schools have been asked to move to remote learning starting April 8 through at least May 4.
Child supervision services such as daycare & after school care	General services are suspended.
Mitigation measures: physical distancing	Not applicable
Mitigation: reducing the number of potential contacts	Not applicable
Mitigation: avoid mixing between groups	Not applicable
Mitigation: increased ventilation	Not applicable
Mitigation: enhanced hygiene and cleaning	Not applicable
Mitigation: reduce access to high touch surfaces	Not applicable
Mitigation: identify and isolate symptomatic students and staff	Not applicable
Mitigation: personal protective equipment	Not applicable
Mitigation: other	Not applicable
Considerations for vulnerable students	Not applicable
Considerations for high risk populations	Not applicable
Notes	Some international schools fall under the Committee for Private Education and have not been affected by prior decisions made by the Ministry of Education, but it is unclear if they must follow this decision. It has been announced that some of these international schools have already closed their campuses or moved to online learning.

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South Korea

Summary	After reassessments, all learning has been conducted remotely since April 9. Limited in-person provisions are created for certain students, including those who are vulnerable.
Decision-making & policy implementation	Decisions regarding opening and closing of schools are being made at the national level by Ministry of Education and KCDC.
Use of in-person classes and remote learning	After multiple assessments and postponements of the school year opening (which was supposed to occur on March 2) since the beginning of March, it has been decided that all courses will move to remote learning as of April 9.
Child supervision services such as daycare & after school care	Uncertain, see information regarding vulnerable populations
Mitigation measures: physical distancing	No further information identified
Mitigation: reducing the number of potential contacts	Yes, minimization of classroom size to 10 students per class; see information regarding vulnerable populations.
Mitigation: avoid mixing between groups	No further information identified
Mitigation: increased ventilation	No further information identified
Mitigation: enhanced hygiene and cleaning	Yes, cleaning and hygiene promotion; see information regarding vulnerable populations.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	Yes, temperature checks for students and staff; see information regarding vulnerable populations.
Mitigation: personal protective equipment	Yes, mask usage; see information regarding vulnerable populations.
Mitigation: other	No further information identified
Considerations for vulnerable students	Services for vulnerable groups, like lunch for low-income households and assistance for those with disabilities, still continuing throughout, including “Emergency Childcare Program” for select students of daycare centerss, kindergartens, and elementary schools that began on March 2; mitigation measures include twice-daily temperature checks for students and staff, cleaning, mask usage, hygiene promotion, and max limit of 10 students per class March 2-April 6: Special ed schools delayed opening
Considerations for high risk populations	No further information identified
Notes	No further information identified

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Spain

Summary	Fall opening for classes is still being planned, but summer activity reopenings are occurring, staggered by province or island.
Decision-making & policy implementation	Decisions on reopening have been made mostly at the national level, with districts having flexibility to make some local decisions on reopenings as well.
Use of in-person classes and remote learning	All schools have been closed since mid-March. The academic year is set to begin in September. Some institutions may open earlier for support activities. A phased reopening (minimum 2 weeks per phase), staggered by province or island, begins May 4.
Child supervision services such as daycare & after school care	No further information identified
Mitigation measures: physical distancing	Not applicable
Mitigation: reducing the number of potential contacts	Not applicable
Mitigation: avoid mixing between groups	Not applicable
Mitigation: increased ventilation	Starting May 2, children are allowed to attend outdoor walks or nonprofessional sports. Time is staggered by age group.
Mitigation: enhanced hygiene and cleaning	Not applicable
Mitigation: reduce access to high touch surfaces	Not applicable
Mitigation: identify and isolate symptomatic students and staff	Not applicable
Mitigation: personal protective equipment	Not applicable
Mitigation: other	Not applicable
Considerations for vulnerable students	Not applicable
Considerations for high risk populations	Not applicable
Notes	Not applicable

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Sweden

Summary	School openings vary by locality, and decision making is left to municipality and school officials. Certain mitigation measures are recommended for any open schools.
Decision-making & policy implementation	"Not part of the National Agency for Education's task to make the decision" to close schools; decision up to municipality and principals. Schools are exempt from March 27 ban of more than 50 people.
Use of in-person classes and remote learning	Some schools are conducting in-person classes for all or some or only using remote learning, but it varies by locality. Some school reopenings are beginning May 4 in Sando and Revigne. Specific closures on preschool, elementary, SAMI, upper secondary, and other education activities are at the discretion of the principal. Healthy students are expected to attend school if open.
Child supervision services such as daycare & after school care	Care available for children of guardians in "socially important activities," contingent on who imposed closures (government or principal). Some preschools are open and may operate an extended day or school week.
Mitigation measures: physical distancing	Modify furniture arrangements in classrooms and cafeterias.
Mitigation: reducing the number of potential contacts	Minimize gatherings.
Mitigation: avoid mixing between groups	Stagger start, break, and exit times between classes.
Mitigation: increased ventilation	Add outdoor breaks and activities.
Mitigation: enhanced hygiene and cleaning	Minimum once daily cleaning of tabletops, handrails, tables, and toilets and emptying of restroom trash. Toys, textbook covers, and keyboards must be cleaned every day.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	No further information identified
Mitigation: personal protective equipment	No further information identified
Mitigation: other	No further information identified
Considerations for vulnerable students	No further information identified
Considerations for high risk populations	No specific guidance is offered by Public Health Agency for high-risk children. Risk groups are defined for ages 18 to 67.
Notes	Country specifically mentioned the importance of sharing correct information and dispelling rumors/conspiracy theories in schools, including addressing source criticism.

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United Kingdom

Summary	As of April 28, all schools are "closed" until further notice except for in-person classes and child supervision for vulnerable students or children of critical workers. Various mitigation measures for these select groups attending in person are in place.
Decision-making & policy implementation	Decisions regarding opening and closing of schools are being made at the national level.
Use of in-person classes and remote learning	Majority of students are engaging in remote learning. Schools, including state schools, have been asked to remain open for children of critical workers and children identified as vulnerable. Extracurricular activities have the same restrictions.
Child supervision services such as daycare & after school care	Only children of critical workers or vulnerable students may attend after care.
Mitigation measures: physical distancing	Other national social distancing guidelines should be followed.
Mitigation: reducing the number of potential contacts	Students should reduce use of public transportation to and from school. Class sizes should be minimized. Parents and guardians cannot gather at school gates.
Mitigation: avoid mixing between groups	Lunch and break times are staggered. Movement of pupils around the building is restricted.
Mitigation: increased ventilation	No further information identified
Mitigation: enhanced hygiene and cleaning	Handwashing and other hygienic behavior should be promoted. Surfaces should be cleaned frequently.
Mitigation: reduce access to high touch surfaces	No further information identified
Mitigation: identify and isolate symptomatic students and staff	Children, guardians, carers, and visitors are told not to enter schools or childcare settings if they are symptomatic.
Mitigation: personal protective equipment	No further information identified
Mitigation: other	No further information identified
Considerations for vulnerable students	Vulnerable children, in this context, include children who have a social worker, and those children and young people with education, health, and care (EHC) plans. Those who have a social worker include children who have a child protection plan and those who are looked after by the local authority. Children may also be deemed to be vulnerable if they have been assessed as being in need or otherwise meet the definition in section 17 of the Children Act 1989. Vulnerable children are allowed to attend in-person classes.
Considerations for high risk populations	No further information identified
Notes	No further information identified

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Johns Hopkins
Center for Health Security

621 E. Pratt Street, Suite 210
Baltimore, MD 21202

Tel: 443-573-3304
Fax: 443-573-3305

centerhealthsecurity@jhu.edu
centerforhealthsecurity.org