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COVID-19 in Victorian ECEC and Schools

An analysis of COVID-19 in ECEC and schools and evidence-based recommendations for opening ECEC and schools & keeping them open

09 November 2020

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Executive Summary

COVID-19 in Victorian ECEC and Schools

An analysis of ECEC and school outbreak data and evidence-based recommendations for re-opening ECEC and schools and keeping them open

Aims

The Murdoch Children's Research Institute (MCRI) undertook an analysis of the global literature and available Early Childhood Education and Care (ECEC) and school outbreak data, 25 January 2020 – 31 August 2020, from the Victorian State Government Department of Health and Human Services (DHHS) to explore 5 key questions:

- What is known about the direct and indirect effects of COVID-19 on children and adolescents?
- What is known globally about the role of ECEC and schools in transmission of SARS-CoV-2 (the virus)?
- What are other countries doing to enable children and teachers to go back to school safely: which mitigation measures are being proposed?
- What do the Victorian data tell us about transmission of the virus in our educational settings?
- What evidence-based recommendations could enable ECEC and schools to open up safely?

1. What do we know about the direct and indirect effects of the virus in children?

COVID-19 in children is generally mild or has no symptoms at all, and is rarely life threatening. However, it is the indirect effects of the pandemic on children and adolescents that cause the most concern including the negative effects of school closures:

Impact on communities: lack of social contact, reduced access to health care, dependence on technology for access to health care and education[1,2,3,4,5]

Impact on families: poorer parent mental health, competing demands and increased stress, job losses and reduced income, impacts on perinatal and mental health[6,7,8]

Impact on children: poorer mental health and increasing behavioural and developmental concerns, lack of access of adequate play and social opportunities, increased isolation, academic impacts, child abuse and neglect.[9,10,11,12,13]

In all of these aspects, disadvantaged families seem to be disproportionately affected.

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Figure 1. RCH Poll.

Mental health

There is emerging evidence from Australia and from Victoria of the mental health impacts on children. In the recent RCH National Child Health Poll, 1 in 3 parents reported that the COVID-19 pandemic had negatively affected their child's mental health-and that was before the recent Stage 4 lockdown in Victoria (Figure 1).[14] At a similar time, the Victorian Commission for Children and Young People reported negative impacts on mental health and wellbeing, describing experiences of loneliness and isolation, disruption to routines and coping mechanisms, worry for loved ones and increased stress associated with remote learning.[15]

The importance of ECEC and schools

ECEC and schools are an essential part of society and children's lives. They provide safe, supportive learning environments for students, employ teachers and other staff, and enable parents and guardians to work. They also provide social, physical, behavioural, and mental health benefits and services. School closures disrupt the delivery of these services, and place additional economic and psychological stress on families, which can increase the risk for family conflict and violence.[16]

ECEC and schools play a critical role enabling students to receive both academic instruction and provide critical mental health and social support, especially for the most vulnerable of students, making them a priority for opening and remaining open.

2. What is known globally about the role of ECEC and schools in transmission of the virus

Children and transmission

Children transmit the virus. The latest scientific evidence shows that children may not play a more significant role than adults in transmission. Children more than 10 years old probably transmit the virus at a similar rate to adults; while younger children may transmit less,[17] [18] although some studies from school camp outbreaks and India suggest children transmit to a similar degree as adults.[19] [20] [21]

As infected children often have no symptoms (asymptomatic) or develop only mild symptoms, it is harder to detect infection in this age group. At present, it is unclear whether asymptomatic children are infectious,[22] although a global review found that asymptomatic index cases were far less likely to transmit compared with symptomatic index cases.[23]

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Transmission in ECEC and schools

There is consistent evidence globally that transmission of the virus within the school setting is low, however this is based on a small number of studies, and the evidence is considered to be weak.[24] So far, studies have found that schools are not at greater risk of infection than other public places, and are unlikely to drive transmission, if proper and consistent mitigation measures are in place. New South Wales has also found this to be the case.[25]

Internationally it appears that infections in schools are directly associated with rising case numbers in the broader community. **Importantly, data from a number of countries in the European Union (EU), the United Kingdom (UK), Taiwan, Hong Kong and South Korea suggest that reopening schools in the context of school mitigation measures, has not been associated with increases in community transmission.**[26] [27] [28] [29] In England, only 0.01 percent of open schools had an outbreak.[30]

Sweden vs Finland

Rates of infection in ECEC and school children were no different between Finland (which closed schools) versus Sweden (which did not, except for children >16 years who schooled remotely). **Primary school closure and reopening in Finland did not have any significant impact on infection rates in primary school aged children.** Additionally, there was no increased risk of infection in Swedish teachers and child-care workers compared to other professions.[31]

While very few significant outbreaks have been reported in schools globally, they do occur, and this has often been associated with high rates of community transmission and lack of adherence to mitigation measures in the school setting. Investigations of cases identified in schools suggest that child-to-child transmission in schools is uncommon and not the primary cause of infection in children. Household transmission has been consistently found to be one of the commonest sources of infection for children.[32]

3. What are other countries doing to enable children and teachers to go back to school safely: which mitigation measures are being proposed?

The single best policy to support school reopening prior to the development of a vaccine or treatment is the suppression of COVID-19 to near zero case incidence in the broader community.[33] This can be achieved via universal mask wearing, social distancing, reduction or elimination of indoor gatherings, staying home when sick, and rigorous and timely Testing, tracing and isolation within 48 hours of a notification.

The Harvard Global Health Institute's "The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces"[34] recommends that schools open up based on a traffic light system according to community level of the incidence of the virus (see Recommendations). In South Korea, each school determines which level of mitigation will be in place based on the number of students and

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[34] Harvard Global Health Institute. *The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces*.

local transmission rates. New South Wales has prevented school outbreaks by having a combination of a) low community transmission; b) school mitigation strategies in place; and c) a rapid public health response to any cases in schools to prevent onward transmission. Recent analysis found onward transmission in New South Wales preschools, primary and secondary schools up until the end of Term 3 to be very low (~1% percent).[35]

In Victoria, ECECs and schools have adopted SARS-CoV-2 mitigation strategies in line with broader statewide strategies. The DET has supported ECECs and schools to respond to and minimise the risk of infection since the beginning of the pandemic, on advise from the Chief Health Officer. Guidance and other supports provided to schools have been updated regularly to respond to the changing epidemiology. Throughout the pandemic, DET has provided principals, teachers and school staff with the resources they need to support their own and students' mental health and wellbeing. These supports include the allocation of a Regional Health and Wellbeing Key Contact to each government school to plan and respond to the needs of students who may be at risk or require additional support. They also include the facilitation of the remote delivery of mental health and wellbeing services and the online provision of a variety of mental health resources. The Victorian Government has also announced a two-year $28.5 million package to support students' mental health and engagement with a focus on the needs of vulnerable students.

4. What do the Victorian data tell us about transmission of the virus in our educational settings?

We analysed all Victorian ECEC and school events that recorded at least 1 person who attended an ECEC or school while infectious. People who have the virus usually become infectious 2 days before they develop symptoms. We included events with a single case (where 1 person with the virus has attended a school while they are infectious) and events with 2 or more cases (an outbreak).

We analysed the Victorian DET COVID-19 risk mitigation guidelines for ECEC and schools [36] and compared these against international advice for ECEC and schools.[37] [38]

The Victorian findings are consistent with the international literature.

[35] National Centre for Immunication Research and Surveillance. "Learning Together – Transmission of Sars-Cov-2 in Nsw Educational Settings." Ministry of Health. Last modified 22 Sept, 2020.
[36] Victorian Department of Education and Training (DET). *Health and Safety Advice for on-Site Schooling in the Context of Coronavirus (Covid-19)*. Victoria: DET, 2020. https://is.vic.edu.au/wp-content/uploads/2020/03/Managing-risk-covid-19-school-boarding-premises_11082020docx.pdf.
[37] Jones, E, A Young, K Clevenger, et al., *Healthy Schools: Risk Reduction Strategies for Reopening Schools*: Harvard T.H. Chan School of Public Health Healthy Buildings program, 2020. https://schools.forhealth.org/wp-content/uploads/sites/19/2020/06/Harvard-Healthy-Buildings-Program-Schools-For-Health-Reopening-Covid19-June2020.pdf.
[38] Viner, Russell M, Simon J Russell, et al. "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review." *The Lancet Child & Adolescent Health* 4 (2020): 397-404. https://dx.doi.org/https://doi.org/10.1016/S2352-4642(20)30095-X.

School transmission reflects community transmission

There were very few cases in ECEC and schools when community transmission was low from March to May. Infections associated with ECEC and schools peaked at the time when community transmission was highest during July and then declined in August, suggesting that cases in ECEC and schools are driven primarily by transmission in the broader community (Figure 2).

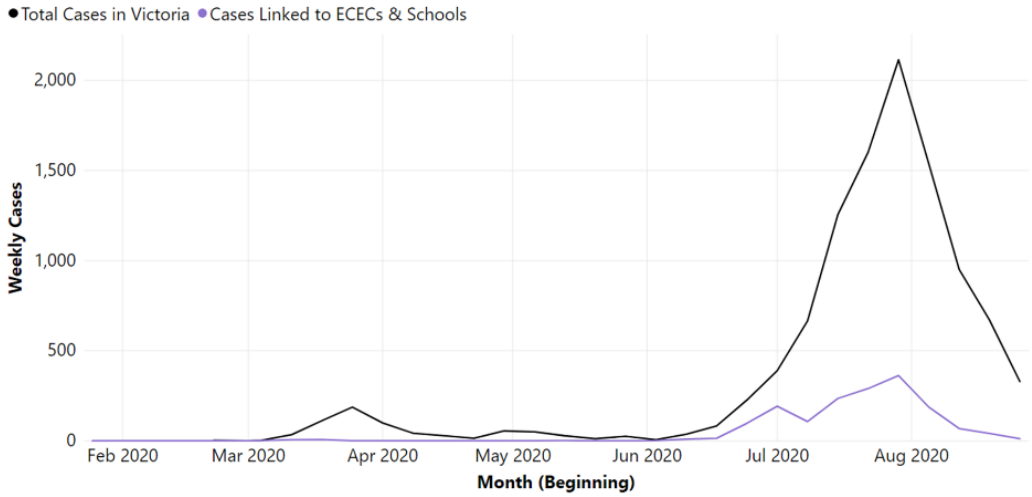

***Figure 2**. Epidemiological curve of known SARS-CoV-2 infections in children and adults associated with ECEC and schools, in comparison to total cases diagnosed in Victoria.*

This is further supported by the geographic distribution of cases associated with ECEC and schools at a local government area (LGA) level, which was highly consistent with the broader epidemic (Figure 3).

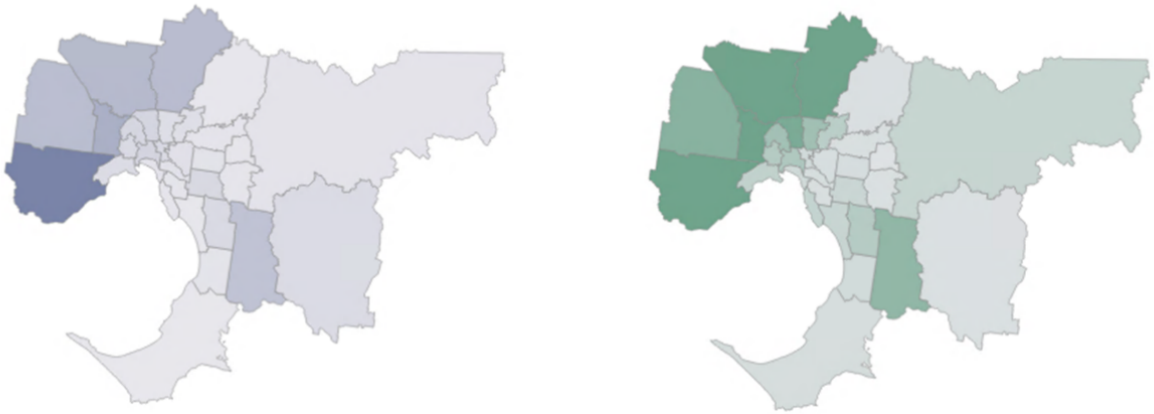

***Figure 3**. Geographic distribution of SARS-CoV-2 infections associated with events in ECEC and schools (left), and not associated with ECEC and schools (right).*
Density of shading represents number of cases in the LGA, darker shading = more cases

Overall transmission was low in ECEC and schools

Children aged less than 12 years seem to transmit less than adolescents & adults. If the first case was a young child aged 0-5, an outbreak (2 or more cases) was very uncommon.

- There were 1,635 cases associated in some way with ECEC and schools including 254 staff, 599 students and 753 household members, out of a total of 19,109 cases in Victoria. Cases associated with ECEC and schools include cases among household members, students and staff who may have introduced SARS-CoV-2 into the school or ECEC, as well as second or third generation cases that could be linked back to outbreaks that started in schools.
- 67 percent of events involved a single case in a staff member or student

- 92 percent of events involved 10 cases or less
- Fewer events in primary schools went on to become outbreaks compared to secondary schools (30 vs 41 percent)
- Secondary schools required more extensive contact tracing than events in primary schools due to higher median number of contacts (53 vs 16 median contacts per event)
- Of 1 million enrolled students, 337 may have acquired SAR-CoV-2 via outbreaks that started at schools, including second and third generation cases
- Of 139 staff & 373 students who may have acquired infection via outbreaks that started at ECEC or schools, 8 (4 staff and 4 students) were admitted to hospital and all recovered
- Outbreaks at ECEC and schools were rarely associated with infections in the most vulnerable population, the elderly

Almost half of the cases associated with ECEC and schools were in household members (Figure 4). . This includes the families of students or staff who may have introduced SARS-CoV-2 into ECEC or schools, as well as the families of students or staff who could have aquired SARS-CoV-2 infection at schools.

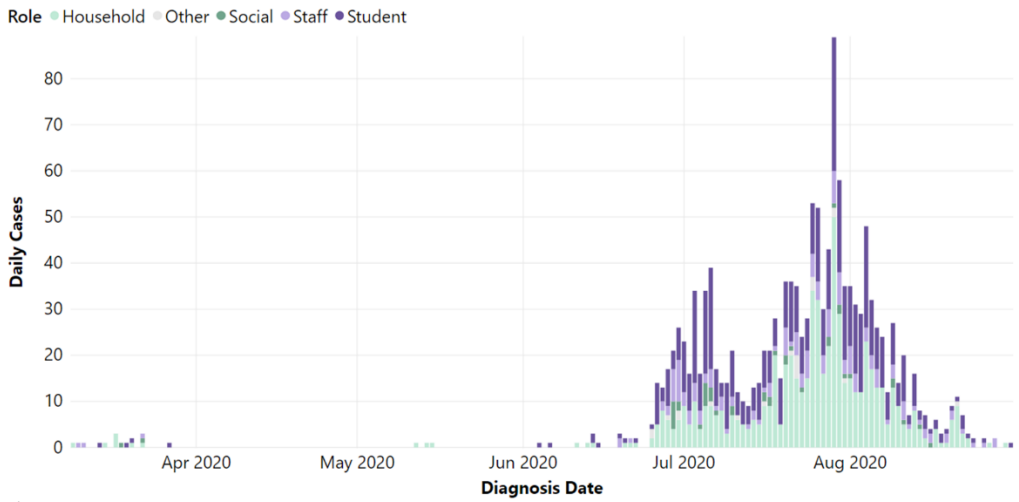

***Figure 4**. Confirmed SARS-CoV-2 cases associated with ECEC and schools according to the relationship to the ECEC or school.*

The ECEC and school outbreak response was effective overall

Throughout the pandemic DET has worked closely with DHHS to improve processes regarding ECEC and school closures. Whilst the average time between confirmation of a first case and closure of the facility was 2 days, improved processes implemented by DET and DHHS resulted in this timeframe shortening over time. On average ECEC and schools were closed for 9 days. These measures were effective, as the majority (66 percent) of ECEC and school events were limited to a single case and did not progress to an outbreak (2 or more cases). Where there were large outbreaks (more than 10 cases), the average number of contacts were far greater (229 vs 41) and the ECEC or school remained closed for longer (average closure 18 days vs 9 days).

This analysis of Victorian and international data show that when risk reduction strategies are in place, ECEC and schools are controlled environments, with no greater risk of infection than other places. Infections in ECEC and schools were well contained with existing controls and rapid closure, contact tracing and cleaning. When cases did occur, serious illness was rare in both students and staff, and very rarely involved the elderly.

ECEC and schools are unlikely to drive transmission, and mitigation measures were effective overall.

5. What evidence-based recommendations could enable ECEC and schools to open up safely?

Recommendations

1. **ECEC and schools should be prioritised for reopening and staying open to guarantee equitable learning environments and lessen social and educational effects of school closure.**
2. **Closing ECEC and schools should be a last resort, especially for ECEC and primary schools as children in these age groups are less likely to transmit and be associated with an outbreak.**
3. **There should be a staged mitigation approach to opening up and staying open.**
4. **Gathering data and evidence in term 4 is recommended to inform future education and health policy.**
5. **Testing, tracing and isolation within 48 hours of a notification is the most important strategy to prevent an outbreak.**

ECEC and school mitigation strategy

ECEC and schools across Victoria could be opened up safely and stay open to protect the health, safety, and wellbeing of students, teachers, and other staff.

This should be based on the incidence of community transmission and as this varies by geographical location (e.g. LGA - hypothetical only Figure 5). Different colour-coded strategies to reduce risk are proposed which could be eased or progressed depending on Victoria's Coronavirus Road to Recovery Step level and proportionate to the incidence of infection in each geographic area (Table 1 and 2).

Proposed mitigation strategies have been suggested that augment existing Department of Education and Training policy and align with the Harvard Healthy Building Programs which focuses on Healthy buildings, classrooms, policies, schedules and activities.[39]

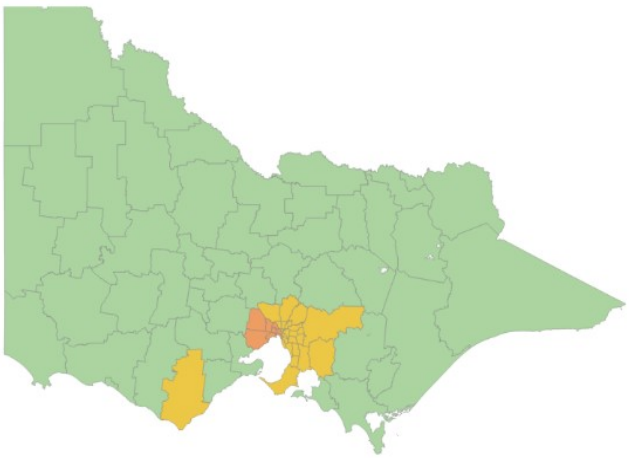

***Figure 5**. Hypothetical example of proposed mitigation strategies by region, Victoria.*

[39] Harvard Global Health Institute. The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces. Massachusetts: Harvard Global Health Institute, 2020. https://globalepidemics.org/wp-content/uploads/2020/07/pandemic_resilient_schools_briefing_72020.pdf.

Table 1. *Summary of colour-coded strategies for ECEC and schools.*

Colour	Strategies
Green	Standard precautions (hygiene, physical distancing, enhanced cleaning, ventilation)
Yellow	+ Masks (teachers/staff + secondary students) + Enhanced physical distancing (especially staff) + No singing, no indoor sports, no wind instruments
Orange	+ 50% attendance for Years 7-10
Red	Consider closure

Table 2. *An example of opening up ECEC and schools safely according to the Victorian Coronavirus Road to Recovery, by colour-code and geographical area.*

Road to recovery step	Metro Melbourne	Regional/LGA
Second	Yellow: all ECEC, primary, special schools & VCE	Yellow
	Orange: Years 7-10 only	
Third	Yellow	Green
Last	Green	Green
COVID-19 Normal	Green	Green

LGA: Local Government Area. ECEC: Early Childhood Education and Care. VCE: Victorian Certificate of Education.

Gather data and evidence in term 4 to inform future education and health policy

There are a number of gaps in our knowledge such as transmission from asymptomatic children, the direction of transmission to, from and within ECEC and schools, and how best to informl closures based on balancing safety against the associated potential academic and wellbeing impacts. In addition to minimising risk of viral transmission, it is crucial that the indirect effects of physical distancing, isolation, and ECEC and school closures are measured and addressed. Nevertheless, these gaps in knowledge are not a reason to delay ECEC and schools re-opening. To address these gaps, we need to monitor and investigate transmission together with wellbeing and mental health impacts in ECEC and schools to inform medium term policy decisions. Therefore, further research should be undertaken.

Abbreviations

Abbreviation	Term
CDC	Centers for Disease Control and Prevention
COVID-19	Coronavirus-19 disease
CRISIS tool	The CoRonavIruS Health Impact Survey
DET	Department of Education and Training, Victoria
DHHS	Department of Health and Human Services, Victoria
ECEC	Early Childhood Education and Care
EAA	European Economic Area
EU	European Union
GRADE	The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach
IQR	Interquartile range
LGA	Local Government Area
MERS	Middle East Respiratory Syndrome Coronavirus
MCRI	Murdoch Children's Research Institute
n	Total number of participants in the sample under study
NP	Nasopharyngeal
NPI	Non-pharmaceutical interventions
PHESS	Public Health Events Surveillance System
PPE	Personal Protective Equipment
R	Reproductive number
REDCap	Research Electronic Data Capture
R0	Basic reproductive number
RT-PCR	Reverse transcription polymerase chain reaction
SARS	Severe Acute Respiratory Syndrome Coronavirus 1
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
sKIDs Study	COVID-19 Surveillance in school KIDs - COVID-19 Surveillance in Children attending preschool, primary and secondary schools study, Public Health England[40]
UK	United Kingdom
USA	United States of America
VCE	Victorian Certificate of Education
WHO	The World Health Organization

[40] Public Health England. *Covid-19 Surveillance in School Kids (Skid) Study Protocol*. 1.4 ed. England: PHE, 2020. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904207/sKIDS_protocol_v1.4.pdf.

Background

1. Rationale

The Murdoch Children's Research Institute (MCRI) undertook an analysis of the global literature and available Early Childhood Education and Care (ECEC) and school outbreak data, 25 January 2020 – 31 August 2020, from the Department of Health and Human Services (DHHS), in order to guide future policy decisions and any operational COVID-19 research required. The MCRI explored key questions provided by the Department of Education and training (DET) and DHHS relating to transmission of SARS-CoV-2 in ECEC and schools and the impact of public health actions on curbing transmission. This report outlines what is known about the direct and indirect effects of SARS-CXoV-2 on children and adolescents; what is known globally about the role of ECEC and schools in SARS-CoV-2 transmission; describes what other countries are doing in terms of school mitigation measures; and provides recommendations for opening up ECEC and schools safely.

In Victoria, ECECs and schools have adopted SARS-CoV-2 mitigation strategies in line with broader statewide strategies (Figure 6). DET has supported ECECs and schools to respond to and minimise the risk of infection since the beginning of the pandemic. DET works with DHHS to provide guidance to ECEC and schools in line with advice from the Victorian Chief Health Officer, and support the response to confirmed cases and outbreaks. Guidance and other supports provided to schools have been updated throughout the year to respond to the changing epidemiology and evidence regarding SARS-CoV-2 transmission.

The earliest school specific strategy occurred on 24 March 2020, when Term 1 ended early to allow school staff time to plan for flexible learning that was to commence in Term 2. When school returned in Term 2, only students of essential services personnel and vulnerable children attended face-to-face learning; all other students learnt from home. Staggered return to school commenced on 25 May when students in prep, grades 1, 2 and years 11 and 12 returned to face-to-face learning. All other students returned on 9 June. When students returned for Term 3, metropolitan Melbourne was in Stage 3 restrictions and only years 11 and 12 returned to face-to-face learning. On 6 August, Stage 4 restrictions were implemented in Metropolitan Melbourne and all Victorian students returned to remote learning, with a smaller list of essential workers permitted to send their child to school. On 6 September, the Victorian Government announced the Roadmap to Reopening that included plans for easing restrictions and level of transmission at which students can return to face-to-face learning. A staggered return to face-to-face learning occured across Melbourne for Term 4. In regional and rural parts of Victoriaspecialist schools and primary school students returned to face to face learning from week 1 (5 October); with all other year levels returning in week 2 (12 October). In metropolitan parts of Victoria, specialist schools, prep to year 7 and years 11 and 12 students will return to face to face learning in week 2 (12 October), with the remaining years returning in week 4 (26 October).

ECEC services remained open throughout Stage 2 and Stage 3 restrictions in Victoria. Prior to August 6, ECECs recorded significantly reduced attendance resulting from parental decisions rather than Government policy. In rural and regional Victoria, ECEC services remained open throughout the year. On August 6 when Stage 4 restrictions were implemented in Metropolitan Melbourne, all ECEC in Metropolitan Melbourne also closed, except for children of essential service workers and children considered vulnerable. In Metropolitan Melbourne ECEC services were open to all children from 28 September.

Guidance provided to schools includes advice on transmission reduction strategies, adjustments to school operations and managing suspected and confirmed cases. The DET has also provided advice to schools on the use of Personal Protective Equipment and additionally supported government schools through the development of a COVIDSafe Plan for Schools. The DET has provided mental health and wellbeing support for students and school staff with resources to support their own and students' mental health and wellbeing.

The DET also recognises that mental health and wellbeing support for students given the impact of physical distancing and isolation during the pandemic and over the longer term. The DET is continuing to provide principals, teachers and school staff with the resources they need to support their own and students' mental health and wellbeing. These supports include the allocation of a Regional Health and Wellbeing Key Contact to each government school to plan and respond to the needs of students who may be at risk or require additional support. They also include the facilitation of the remote delivery of mental health and wellbeing services and the online provision of a variety of mental health resources. The Victorian Government has also announced a two-year $28.5 million package to support students' mental health and engagement with a focus on the needs of vulnerable students.

Extensive support and information has also been provided to ECEC services. Through-out the pandmemic, DET Authorised officers have called and visited services to ensure there are appropriate measures in place to protect the safety, health and well-being of children attending services. The focus of these contacts is to ensure that services understand and are following the COVID-19 risk mitigation strategies and to monitor service compliance. There has been additional focus on family day care,in view of the increased risks of education and care provided in people's homes.

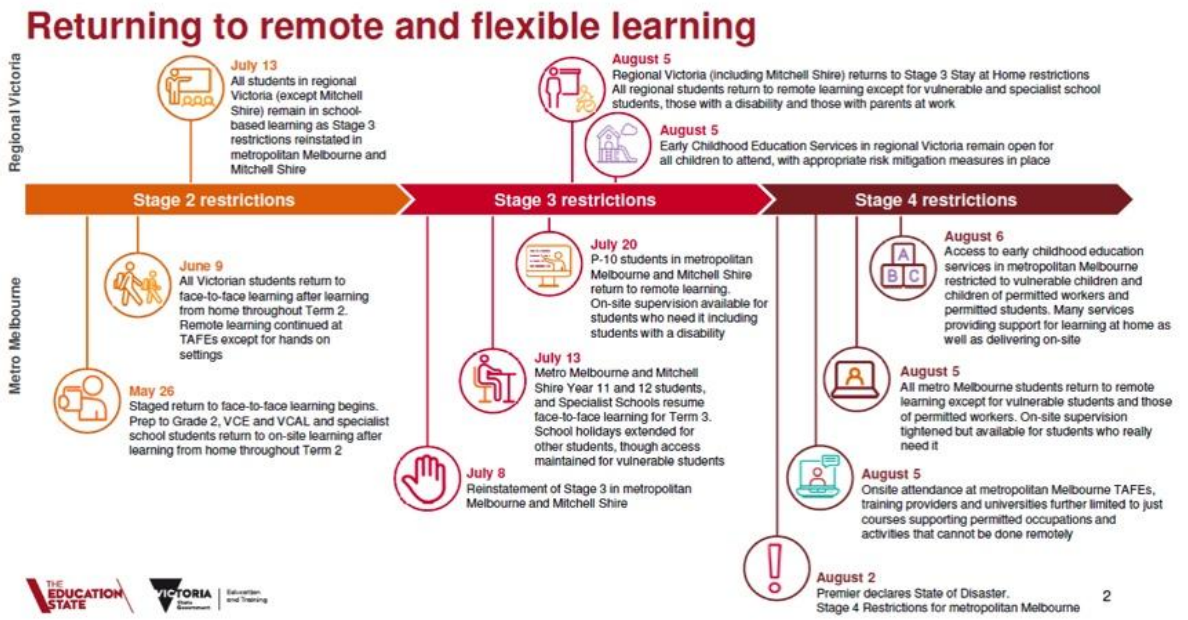

***Figure 6**. Returning to Remote and Flexible Learning (Source: DET)*

2. Aims

- What is known about the direct and indirect effects of COVD-19 on children and adolescents?
- What is known globally about the role of ECEC and schools in transmission of SARS-CoV-2?
- What are other countries doing to enable children and teachers to go back to ECEC and schools safely: which mitigation measures are being proposed?
- What do the Victorian data tell us about transmission of the virus in our educational settings?
- What evidence-based recommendations could enable ECEC and schools to open up safely?

3. What we know about the direct and indirect effects of SARS-CoV-2 in children

- **COVID-19 is generally mild or asymptomatic and is rarely life threatening in children.**
- **ECEC and schools provide safe, supportive learning environments for students, employ teachers and other staff, and enable parents and guardians to work.**
- **ECEC and schools also provide social, physical, behavioural, and mental health services.**
- **School closures disrupt the delivery of these services, and places additional economic and psychological stress on families, which can increase the risk for family conflict and violence.**[41] [42]
- **In a Victorian study prior to stage 4 lockdown, most children and young people reported negative impacts on their mental health and wellbeing, describing experiences of loneliness and isolation, disruption to routines and coping mechanisms, worry for loved ones and increased stress associated with remote learning.**[43]
- **The critical role that schools play makes them a priority for opening and remaining open, enabling students to receive both academic instruction and support as well as critical services, especially for the most vulnerable of students.**
- **Understanding and monitoring the mental health and wellbeing impacts of these restrictions in order to curb the transmission of SARS-CoV-2 is vitally important.**

National statistics from countries in Asia, Europe, and North America show that paediatric cases account for 2.1–7.8 percent of all confirmed COVID-19 cases.[44] An analysis of 35,200 children in England who were tested for SARS-CoV-2 during the first four months of the pandemic peak found that 4 percent of children, compared with 19.1 percent to 34.9 percent in adults and older adults were positive. Current evidence shows that children are at lower risk of severe illness or death from COVID-19 than adults.[45] Although the manifestations of the disease are generally milder in children than in adults, a small proportion of children require hospitalisation and intensive care.[46] SARS-CoV-2 can manifest as a severe condition in children, called Paediatric Multisystem Inflammatory Syndrome, which can lead to serious illness and long-term side-effects, but this condition is very rare.[47]

The necessary public health mitigation measures to curb the epidemic have resulted in the closure of ECEC and schools in many countries during the peak of community transmission. However, the closure of schools is well documented to adversely impact children in their learning, physical and mental health, social support, exposure to violence in the home, school-delivered public health interventions,

[41] Substance Abuse and Mental Health Services Administration. Intimate Partner Violence and Child Abuse Considerations During Covid-19.
[42] CDC. "Preparing for a Safe Return to School." Last modified 26 AUg, 2020. Accessed 14 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/prepare-safe-return.html.
[43] Commision for Children and Young People. *Impact of Covid-19 on Children and Young People: Mental Health*. Victoria, 2020. https://ccyp.vic.gov.au/assets/COVID-Engagement/CCYP-Mental-Health-Snapshot-web.pdf.
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Government of Canada. "Coronavirus Disease 2019 (Covid-19): Epidemiology Update." Government of Canada. Last modified 6 Sept 2020, 2020. Accessed 7 Sept, 2020. https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html.
Government of Pakistan. "Pakistan Cases Details." Ministry of National Health Services Regulations & Coordination. 2020. Accessed 1 Sept, 2020. http://covid.gov.pk/stats/pakistan.
[45] Otto, William R, Sarah Geoghegan, Leila C Posch, Louis M Bell, Susan E Coffin, Julia S Sammons, Rebecca M Harris, Audrey R Odom John, Xianqun Luan, and Jeffrey S Gerber. "The Epidemiology of Severe Acute Respiratory Syndrome Coronavirus 2 in a Pediatric Healthcare Network in the United States." *Journal of the Pediatric Infectious Diseases Society* (2020). https://dx.doi.org/10.1093/jpids/piaa074.
[46] Jiang, Li, Kun Tang, Mike Levin, Omar Irfan, Shaun K Morris, Karen Wilson, Jonathan D Klein, and Zulfiqar A Bhutta. "Covid-19 and Multisystem Inflammatory Syndrome in Children and Adolescents." *The Lancet Infectious Diseases* (2020). https://dx.doi.org/https://doi.org/10.1016/S1473-3099(20)30651-4.
The World Health Organization. "Multisystem Inflammatory Syndrome in Children and Adolescents with Covid-19." The World Health Organization. Last modified 15 May 2020, 2020. Accessed 3 Sept, 2020. https://www.who.int/publications/i/item/multisystem-inflammatory-syndrome-in-children-and-adolescents-with-covid-19.
[47] Jiang Li, et al., "Covid-19 and Multisystem Inflammatory Syndrome in Children and Adolescents."

and a range of indirect impacts on families.[48] School programs are even more essential for a range of social development and public health reasons for children, families and broader society.[49] Time spent away from in-person classes, particularly for younger students, can lead to academic regression as well as reduced access to critical services, such as school meals, that could have short- and long-term effects.[50] A study from Denmark found that school closures had increased inequalities in learning opportunities.[51]

A Victorian study looking at emergency presentations of children (<18 years) found that although there was an overall decline in presentations for children, there was a 35 percent increase in attendances for mental health conditions.[52] The recent Royal Children's Hospital national health poll surveyed families in June 2020 (prior to stage 4 lockdown in Victoria) and found that the pandemic had negatively impacted the mental health of both parents (48 percent) and children (36 percent).[53] Loneliness was a common experience for both parents and children and was strongly linked to negative mental health impacts. School employees also play an essential part in identifying cases of child neglect and abuse; about 20 percent of cases are reported by school staff. Evidence from the USA suggests that incidents of child abuse and neglect have increased since the pandemic.[54] These harms are greater in more deprived families, thus worsening health and educational inequalities. In a Victorian study conducted over April-July 2020, most children and young people reported negative impacts on their mental health and wellbeing, describing experiences of loneliness and isolation, disruption to routines and coping mechanisms, worry for loved ones and increased stress associated with remote learning.[55]

There is little data from parents of children with special educational needs and disabilities. One study from the UK found that parents of affected children and their children were experiencing loss, worry and changes in mood and behaviour during the pandemic. Some parents reported feeling overwhelmed, and only a minority of parents reported that the pandemic had little impact on the mental health of their family, but had led to improvements.[56]

4. What is the role of children in transmission?

- **Children transmit SARS-CoV-2.**
- **What is not known is whether children tranmsit more, less or the same as adiults as mitigation strategies are put in place to prevent transmission.**
- **The latest scientific evidence has shown that children do not play a more significant role than adults in transmission, and that children more than 10 years old may transmit SARS-CoV-2 at a similar rate to adults,[57] while younger children may transmit less,[58] although some studies from school camp outbreaks and India suggest children transmit to a similar degree as adults.[59] [60] [61]**

[48] Viner, Russell M, Simon J Russell, Helen Croker, Jessica Packer, Joseph Ward, Claire Stansfield, Oliver Mytton, Chris Bonell, and Robert Booy. "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review." *The Lancet Child & Adolescent Health* 4 (2020): 397-404. https://dx.doi.org/https://doi.org/10.1016/S2352-4642(20)30095-X.
[49] Viner, Russell M, et al., "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review."
[50] Levinson, Meira, Muge Cevik, and Marc Lipsitch. "Reopening Primary Schools During the Pandemic." *New England Journal of Medicine* 383, no. 10 (2020): 981-85. https://dx.doi.org/10.1056/NEJMms2024920.
[51] Jæger, Mads Meier, and Ea Hoppe Blaabæk. "Inequality in Learning Opportunities During Covid-19: Evidence from Library Takeout." *Research in Social Stratification and Mobility* 68 (2020/08/01/ 2020): 100524. https://dx.doi.org/https://doi.org/10.1016/j.rssm.2020.100524.
[52] Cheek, John A, Simon S Craig, Adam West, Stuart Lewena, and Harriet Hiscock. "Emergency Department Utilisation by Vulnerable Paediatric Populations During the Covid-19 Pandemic." Emergency Medicine Australasia n/a, no. n/a (https://dx.doi.org/10.1111/1742-6723.13598).
[53] The Royal Children's Hospital Child Health Poll. *Covid-19 Pandemic: Effects on the Lives of Australian Children and Families*. Vol. Poll Number 18. The Royal Children's Hospital Melbourne, Parkville, Victoria, 2020. https://www.rchpoll.org.au/wp-content/uploads/2020/07/nchp-poll18-report-covid.pdf.
[54] Greeley, Christopher Spencer. "Child Maltreatment Prevention in the Era of Coronavirus Disease 2019." *JAMA Pediatrics* (2020): e202776-e76.https://dx.doi.org/10.1001/jamapediatrics.2020.2776.
Thomas, Elizabeth York, Ashri Anurudran, Kathryn Robb, and Thomas F. Burke. "Spotlight on Child Abuse and Neglect Response in the Time of Covid-19." *The Lancet Public Health* 5, no. 7 (2020): e371. Accessed 3 Sept. 2020. https://dx.doi.org/10.1016/S2468-2667(20)30143-2.
[55] Commision for Children and Young People. *Impact of Covid-19 on Children and Young People: Mental Health*. Victoria, 2020. https://ccyp.vic.gov.au/assets/COVID-Engagement/CCYP-Mental-Health-Snapshot-web.pdf.
[56] Asbury, Kathryn, Laura Fox, Emre Deniz, Aimee Code, and Umar Toseeb. "How Is Covid-19 Affecting the Mental Health of Children with Special Educational Needs and Disabilities and Their Families?", *Journal of Autism and Developmental Disorders* (2020/07/31 2020). https://dx.doi.org/10.1007/s10803-020-04577-2.
[57] Park, Young Joon, Young June Choe, et al., "Contact Tracing During Coronavirus Disease Outbreak, South Korea, 2020."
[58] Zhu, Yanshan, Conor J. Bloxham, et al., "Children Are Unlikely to Have Been the Primary Source of Household Sars-Cov-2 Infections." *medRxiv* (2020): 2020.03.26.20044826. https://dx.doi.org/10.1101/2020.03.26.20044826.
[59] Park, Young Joon, Young June Choe, Ok Park, et al., "Contact Tracing During Coronavirus Disease Outbreak, South Korea, 2020." *Emerging Infectious Disease journal* 26, no. 10 (2020). https://dx.doi.org/10.3201/eid2610.201315.
[60] Laxminarayan, Ramanan, Brian Wahl, Shankar Reddy Dudala, et al., "Epidemiology and Transmission Dynamics of Covid-19 in Two Indian States."
[61] Szablewski, Christine, Karen Chang, Marie Brown, et al., "Sars-Cov-2 Transmission and Infection among Attendees of an Overnight Camp — Georgia, June 2020."

- **Children younger than 5 years old with mild to moderate COVID-19 may have high viral load [62] [63] suggesting that young children can potentially be important drivers of SARS-CoV-2, but it is unclear how long children shed live infectious virus.[64]**
- **As children tend to be asymptomatic or develop only mild symptoms, it is harder to detect infection in this age group. At present, it is unclear how infectious asymptomatic children are.[65]**
- **A surveillance strategy that tests only symptomatic children will fail to identify children who are silently shedding the virus, and who may be infectious.**

This is no doubt that children transmit the virus. What is not known is the degree to which they transmit and whether this is more, less or the same as adults. An unpublished meta-analysis on household transmission clusters (n=386 from 12 countries) found that a child index case caused 2.2 percent of secondary infections in the cluster compared to 97.8 percent of secondary cases caused by adult index cases. Additionally, the secondary attack rate in child household contacts was lower compared with adult household contacts (RR=0.62 (95 percent CI 0.42, 0.91).[66]

As infected children often have no symptoms (asymptomatic) or develop only mild symptoms, it is harder to detect infection in this age group. At present, it is unclear whether asymptomatic children are infectious.[67] A study in South Korea found that only a minority of 91 children (7 percent) who were epidemiologically linked to a confirmed case, and were positive for SARS-CoV-2, had symptoms at the time of testing. This highlights that infected children may be more likely to go unnoticed either with or without symptoms and continue on with their usual activities, which may contribute to viral circulation within their community. However, the same meta-analysis as previously mentioned, found that asymptomatic index cases were associated with substantially lower secondary attack rates in contacts compared with symptomatic index cases [RR=0.17 (95%CI 0.09; 0.29)].[68] So, in regions where use of face masks are not widely accepted or used by the general public, asymptomatic carriers may potentially be a reservoir that may facilitate silent spread through a community.[69] However, it is not know whether this is the case for children.

These findings are highly relevant to the development of public health strategies to mitigate and contain spread within communities, particularly as affected communities begin their recovery phases.[70] School closures, which are so important during community transmission, and children avoiding contact with their grandparents, mean that understanding the natural history of transmission in this population is challenging as studies are confounded by the necessary public health mitigation measures, which prevent transmission. Additionally, there are few studies that include serology and test asymptomatic contacts, which limits the understanding of true infection rates and transmission potential in this group. Further research is needed as in the future, as children may need to be vaccinated to prevent transmission in order to be able to lift the current mitigation measures.

[62] Heald-Sargent, Taylor, William J. Muller, Xiaotian Zheng, Jason Rippe, Ami B. Patel, and Larry K. Kociolek. "Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2) Levels in Patients with Mild to Moderate Coronavirus Disease 2019 (Covid-19)." *JAMA Pediatrics* 174, no. 9 (2020): 902-03. Accessed 9/9/2020. https://dx.doi.org/10.1001/jamapediatrics.2020.3651.
[63] Heald-Sargent, Taylor, et al., "Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2) Levels in Patients with Mild to Moderate Coronavirus Disease 2019 (Covid-19)."
[64] Han, Mi Seon, Eun Hwa Choi, Sung Hee Chang, Byoung-Lo Jin, Eun Joo Lee, Baek Nam Kim, Min Kyoung Kim, Kihyun Doo, Ju-Hee Seo, Yae-Jean Kim, Yeo Jin Kim, Ji Young Park, Sun Bok Suh, Hyunju Lee, Eun Young Cho, Dong Hyun Kim, Jong Min Kim, Hye Young Kim, Su Eun Park, Joon Kee Lee, Dae Sun Jo, Seung-Man Cho, Jae Hong Choi, Kyo Jin Jo, Young June Choe, Ki Hwan Kim, and Jong-Hyun Kim. "Clinical Characteristics and Viral Rna Detection in Children with Coronavirus Disease 2019 in the Republic of Korea." *JAMA Pediatrics* (2020). https://dx.doi.org/10.1001/jamapediatrics.2020.3988.
[65] Han, Mi Seon, Eun Hwa Choi, Sung Hee Chang, Byoung-Lo Jin, Eun Joo Lee, Baek Nam Kim, Min Kyoung Kim, Kihyun Doo, Ju-Hee Seo, Yae-Jean Kim, Yeo Jin Kim, Ji Young Park, Sun Bok Suh, Hyunju Lee, Eun Young Cho, Dong Hyun Kim, Jong Min Kim, Hye Young Kim, Su Eun Park, Joon Kee Lee, Dae Sun Jo, Seung-Man Cho, Jae Hong Choi, Kyo Jin Jo, Young June Choe, Ki Hwan Kim, and Jong-Hyun Kim. "Clinical Characteristics and Viral Rna Detection in Children with Coronavirus Disease 2019 in the Republic of Korea." *JAMA Pediatrics* (2020). https://dx.doi.org/10.1001/jamapediatrics.2020.3988.
[66] Zhu, Yanshan, Conor J. Bloxham, Katina D. Hulme, et al., "Children Are Unlikely to Have Been the Primary Source of Household Sars-Cov-2 Infections."
[67] Han, Mi Seon, Eun Hwa Choi, Sung Hee Chang, Byoung-Lo Jin, Eun Joo Lee, Baek Nam Kim, Min Kyoung Kim, Kihyun Doo, Ju-Hee Seo, Yae-Jean Kim, Yeo Jin Kim, Ji Young Park, Sun Bok Suh, Hyunju Lee, Eun Young Cho, Dong Hyun Kim, Jong Min Kim, Hye Young Kim, Su Eun Park, Joon Kee Lee, Dae Sun Jo, Seung-Man Cho, Jae Hong Choi, Kyo Jin Jo, Young June Choe, Ki Hwan Kim, and Jong-Hyun Kim. "Clinical Characteristics and Viral Rna Detection in Children with Coronavirus Disease 2019 in the Republic of Korea." *JAMA Pediatrics* (2020). https://dx.doi.org/10.1001/jamapediatrics.2020.3988.
[68] Zhu, Yanshan, Conor J. Bloxham, Katina D. Hulme, et al., "Children Are Unlikely to Have Been the Primary Source of Household Sars-Cov-2 Infections."
[69] DeBiasi, Roberta L., and Meghan Delaney. "Symptomatic and Asymptomatic Viral Shedding in Pediatric Patients Infected with Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2): Under the Surface." *JAMA Pediatrics* (2020). https://dx.doi.org/10.1001/jamapediatrics.2020.3996.
[70] DeBiasi, Roberta L., and Meghan Delaney. "Symptomatic and Asymptomatic Viral Shedding in Pediatric Patients Infected with Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2): Under the Surface."

5. What is known about SARS-CoV-2 transmission in ECEC and schools

- **There is consistent evidence that transmission of SARS-CoV-2 within the school setting is low when community transmission is low, however this is based on a small number of studies, and the evidence is considered to be weak.**
- **Schools are not at greater risk of infection than other public places, and are unlikely to drive transmission, if proper and consistent mitigation measures are in place.**
- **Infections in schools are driven by higher transmission in the broader community.**
- **Low community transmission, a rapid response and school mitigation measures have resulted in very little onward transmission in New South Wales.[71]**
- **Data from a number of EU countries, the UK, Taiwan, Hong Kong and South Korea suggest that reopening schools has not been associated with increases in community transmission.**
- **Importantly, a study found that the rates of infection in day care centres and school children were no different between Finland (which closed schools) versus Sweden (which did not, except for children >16 years who schooled remotely), and primary school closure and reopening in Finland did not have any significant impact on infection rates in primary school aged children. Additionally, there was no increased risk of infection in Swedish teachers and child-care workers compared to other professions.[72]**
- **While very few significant outbreaks occur in schools, they do occur, and may be difficult to detect due to the relative lack of symptoms in children.**
- **Investigations of cases identified in schools suggest that child-to-child transmission in schools is uncommon and not the primary cause of SARS-CoV-2 infection in children.**
- **Schools-based surveillance studies would build further knowledge regarding children and SARS-CoV-2 transmission within ECEC and school settings, and assist with timely outbreak detection, response and control whilst refining the extent of ECEC and school closures.**

Evidence from ECEC and schools internationally suggests that school re-openings are safe in communities whereby the transmission of SARS-CoV-2 is low.[73] If transmission is already high, modelling data from Europe suggests that school re-openings may further increase transmission.[74] A school study from Public Health England found that in June 2020:

- Cases in the wider community were likely to be driving cases in schools, as children were more likely to acquire SARS-CoV-2 infection at home than in school.
- Only 0.01 percent of open educational settings had an outbreak.
- Out of more than 1 million children attending pre-school and primary school in June, only 70 children were affected.
- Children attending school had similar SARS-CoV-2 antibody levels than children not attending school.
- These findings suggest that attending preschool and primary school brings no additional risk to either staff or students during low periods of transmission. However, further studies are needed in the secondary school setting.[75]

The European Centre for Disease Prevention and Control undertook a survey of member countries in August 2020 regarding school outbreaks. During this time, clusters in educational facilities were identified in several of the 15 reporting EU countries, however those that occurred were limited in number and size, and were considered to be exceptional events. Countries where schools had reopened by the time of the survey stated that they had not seen an increase in cases in these settings.[76]

Public Health England undertook a systematic review on published studies and preprints up to 18 June 2020 and concluded that there is limited and weak evidence from 3 epidemiological studies that the transmission of SARS-CoV-2 within schools is low. We re-ran this search for published studies and

[71] National Centre for Immunication Research and Surveillance. "Learning Together – Transmission of Sars-Cov-2 in Nsw Educational Settings." Ministry of Health. Last modified 22 Sept, 2020. Accessed 25 Sept, 2020.
[72] Public Health Agency of Sweden, and Finnish Institute for Health and Welfare. *Covid-19 in Schoolchildren - a Comparison between Finland and Sweden*. Sweden, 2020. https://www.folkhalsomyndigheten.se/publicerat-material/publikationsarkiv/c/covid-19-in-schoolchildren/.
[73] Stage, Helena, Joseph Shingleton, Sanmitra Ghosh, Francesca Scarabel, Lorenzo Pellis, and Thomas Finnie. *Shut and Re-Open: The Role of Schools in the Spread of Covid-19 in Europe*. medRxiv, 2020.
[74] CDC. "Preparing for a Safe Return to School." Last modified 26 AUg, 2020. Accessed 14 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/prepare-safe-return.html.
[75] Ismail, Sharif, Vanessa Saliba, Jamie Lopez Bernal, Mary Ramsay, and Shamez Ladhani. "Sars-Cov-2 Infection and Transmission in Educational Settings: Cross-Sectional Analysis of Clusters and Outbreaks in England." *medRxiv* (2020). https://dx.doi.org/https://doi.org/10.1101/2020.08.21.20178574.
[76] European Centre for Disease Prevention and Control. *Covid-19 in Children and the Role of School Settings in Covid-19 Transmission*. Stockholm: ECDC, 2020. https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-schools-transmission-August%202020.pdf.

preprints, with an expanded search strategy to include ECEC and special schools up to 9 September 2020 and found 2166 published studies and preprints (details of the search can be found in Appendix A).

In Australia, population-based contact tracing data on transmission in schools have revealed minimal transmission in New South Wales during low rates of community transmission.[77] The study conducted in the early phases of the epidemic found:

- 18 cases (9 children and 9 staff) were identified, with a cumulative 863 close contacts, out of which 2 secondary cases (one in high school and 1 in primary school) were found to have tested positive for SARS-CoV-2;
- Open schools with robust infection control measures in place in the early phase of the pandemic were rarely the sources of SARS-CoV-2 transmission, but this was in the context of low community transmission and with schools being mostly closed;
- One limitation of this study is that only one third of the 863 close contacts were tested.

Furthermore, enhanced surveillance in New South Wales schools up to the end of Term 3, found ~70 cases linked to schools overall, and a very low SARS-CoV-2 seroprevalence (~1 percent) in contacts of index cases from preschools, primary and secondary schools. Low community transmission, a rapid response and school mitigation measures have resulted in very little onward transmission in NSW.[78]

School and kindergarten studies from Ireland, France, Germany, Singapore and the UK all indicate that transmission in schools is uncommon.[79] [80] [81] [82] [83] However, asymptomatic contacts were often not tested and not all studies tested for antibodies, so this may have underestimated the extent of transmission. Investigations of cases identified in schools suggest that child-to-child transmission in schools is uncommon and not the primary cause of SARS-CoV-2 infection in children. In the UK, staff members had an increased risk of SARS-CoV-2 infections compared to students in any educational setting, and the majority of cases linked to outbreaks were in staff. The probable transmission direction for the 30 confirmed outbreaks was: staff-to-staff (n=15), staff-to-student (n=7), student-to-staff (n=6) and student-to-student (n=2). In Texas, USA, a high transmission setting, there were more than 1,300 SARS-CoV-2 cases in childcare centres. However, twice as many staff members had been diagnosed as children, suggesting that children may be at lower risk of getting SARS-CoV-2 than adults.[84] They concluded that additional interventions should focus on reducing transmission in and among staff members.[85]

Some countries have never closed primary schools (Iceland, Sweden and Taiwan), and some have reopened schools, for example, Denmark, Finland, Norway, France and Germany. A summary of investigations of SARS-CoV-2 infections in ECEC and schools up to September 2020 is as follows:

- The Dutch government closed schools in anticipation of the first wave in March[86] and when cases had declined by May primary schools began to reopen. To September, the Netherlands has not seen an increase in cases linked to reopened schools;[87]
- Denmark initially reported a slight increase in cases in the community after reopening schools and child-care centers for students aged 2-12 years, followed by steady declines in cases among children between 1 and 19 years of age;[88]

[77] Macartney, Kristine, Helen E Quinn, Alexis J Pillsbury, Archana Koirala, Lucy Deng, Noni Winkler, Anthea L Katelaris, Matthew VN O'Sullivan, Craig Dalton, and Nicholas Wood. "Transmission of Sars-Cov-2 in Australian Educational Settings: A Prospective Cohort Study." *The Lancet Child & Adolescent Health* (2020).
[78] National Centre for Immunication Research and Surveillance. "Learning Together – Transmission of Sars-Cov-2 in Nsw Educational Settings." Ministry of Health. Last modified 22 Sept, 2020. Accessed 25 Sept, 2020.
[79] Danis, K., O. Epaulard, T. Bénet, A. Gaymard, S. Campoy, E. Botelho-Nevers, M. Bouscambert-Duchamp, G. Spaccaferri, F. Ader, A. Mailles, Z. Boudalaa, V. Tolsma, J. Berra, S. Vaux, E. Forestier, C. Landelle, E. Fougere, A. Thabuis, P. Berthelot, R. Veil, D. Levy-Bruhl, C. Chidiac, B. Lina, B. Coignard, and C. Saura. "Cluster of Coronavirus Disease 2019 (Covid-19) in the French Alps, February 2020." *Clin Infect Dis* 71, no. 15 (Jul 28 2020): 825-32. https://dx.doi.org/10.1093/cid/ciaa424.
[80] Danis, K, et al., "Cluster of Coronavirus Disease 2019 (Covid-19) in the French Alps, February 2020."
[81] Fontanet, Arnaud, et al., "Sars-Cov-2 Infection in Primary Schools in Northern France: A Retrospective Cohort Study in an Area of High Transmission."
[82] Yung, Chee Fu, Kai-Qian Kam, Karen Donceras Nadua, Chia Yin Chong, Natalie Woon Hui Tan, Jiahui Li, Khai Pin Lee, Yoke Hwee Chan, Koh Cheng Thoon, and Kee Chong Ng. "Novel Coronavirus 2019 Transmission Risk in Educational Settings." *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* (2020): ciaa794. https://dx.doi.org/10.1093/cid/ciaa794.
[83] Ehrhardt, J, A Ekinci, H Krehl, M Meincke, I Finci, J Klein, B Geisel, C Wagner-Wiening, M Eichner, and SO Brockmann. "Transmission of Sars-Cov-2 in Children Aged 0 to 19 Years in Childcare Facilities and Schools after Their Reopening in May 2020, Baden-Württemberg, Germany." *Eurosurveillance* 25, no. 36 (2020): 2001587. https://dx.doi.org/doi:https://doi.org/10.2807/1560-7917.ES.2020.25.36.2001587.
[84] Spells, Alta, and Kay Jones. "Texas Coronavirus Cases Top 1,300 from Child Care Facilities Alone." CNN. Last modified 6 July, 2020. Accessed 8 Sept, 2020. https://edition.cnn.com/2020/07/06/health/texas-coronavirus-cases-child-care-facilities/index.html
[85] Ismail, Sharif, Vanessa Saliba, Jamie Lopez Bernal, Mary Ramsay, and Shamez Ladhani. "Sars-Cov-2 Infection and Transmission in Educational Settings: Cross-Sectional Analysis of Clusters and Outbreaks in England." *medRxiv* (2020). https://dx.doi.org/https://doi.org/10.1101/2020.08.21.20178574.
[86] Schaart, Eline. "The Netherlands Closes Schools, Bars." Politico. Last modified 15 March, 2020. Accessed 14 Sept, 2020. https://www.politico.eu/article/coronavirus-netherlands-closes-schools-bars/.
[87] Government of the Netherlands. "Covid-19 and the Education Sector. Information for Pupils, Parents, Students, Teachers and Educational Institutions." Government of the Netherlands. 2020. Accessed 14 Sept, 2020. https://www.government.nl/topics/coronavirus-covid-19/questions-about-coronavirus-and-the-education-sector.
[88] Reuters, Thomson. "Reopening Schools in Denmark Did Not Worsen Outbreak, Data Shows." U.S. News and World Report. Last modified 28 May, 2020. Accessed 14 Sept, 2020. https://www.usnews.com/news/world/articles/2020-05-28/opening-schools-in-denmark-did-not-worsen-outbreak-data-shows.

- A study undertaken by the Swedish Public Health Authority compared Finland (which closed schools) versus Sweden (which did not, except for children >16 years who schooled remotely) and found that the rates of infection in day care centres and school children were no different between countries, and primary school closure and reopening in Finland did not have any significant impact on the weekly number of laboratory-confirmed cases in primary school aged children.[89] Additionally, there was no increased risk of infection in Swedish teachers and child care workers compared to other professions.
- In Baden-Württemberg, Germany, school/child-care facilities reopened in May 2020. Children returned to school with 50 percent class size and no face masks, improved ventilation and cleaning. They found over this time that 6 of the 137 cases infected 11 additional pupils (1-3 pupils per case; 3 in childcare facilities, 1 in primary school, 4 in secondary school and 3 in vocational school), whereas no secondary infections could be detected for the remaining cases despite extensive contact tracing. Aside from the 11 secondary cases and another 4 pupils who were infected by 2 teachers, all remaining cases with information on school attendance were caused by sources outside of childcare and school facilities. Infections in the broader community remained low since schools returned.[90]

While few significant outbreaks of SARS-CoV-2 in schools have been documented, they do occur, and may be difficult to detect due to the relative lack of symptoms in children. It is important to understand the conditions that enable outbreaks to happen.

- A study from Israel found that an extreme heatwave, necessitating the relaxation of mask wearing and the need for air-conditioning, large classroom size, and social contact through extra-curricular activities and travel by school bus, were all factors that contributed to a large outbreak in a secondary school.[91]
- In the USA, an outbreak in attendees at a school summer camp found attack rates in children aged 6-10 years, 11-17 years, and 18-21 years to be extraordinarily high: 51 percent, 44 percent and 33 percent, respectively. Children had close contact (slept together in dormitories) and undertook aerosol generating events together (singing and physical activity).[92]
- In Rhode Island, USA, childcare programs reopened in June 2020. The centres needed to meet certain requirements before reopening: reduced enrolment (12 people maximum initially); stable groups in physically separated spaces; mask use in adults; daily symptom screening; enhanced cleaning and disinfection; and classes with a symptomatic person were required to close for 14 days or until the case was ruled out by testing. SARS-CoV-2 cases occurred in 29 childcare programs, with 69 percent having a single case with no apparent secondary transmission. 75 percent of cases occurred when the incidence in the state was increasing. Possible secondary transmission was identified in 4/666 programs, when community transmission increased. The apparent absence of secondary transmission within the other 662 child-care programs was likely the result of response efforts to contain transmission and child - care programs' adherence to requirements, in particular maximum class sizes and use of face masks for adults.[93]
- Salt Lake City, USA, identified 17 child-care facilities (day care facilities and day camps for school-aged children; henceforth, facilities) with at least 2 confirmed SARS-CoV-2 cases within a 14-day period. Twelve children from 3 child-care centres acquired infection from the child-care facility and transmission was found in at least 12 (26 percent) parents and siblings. Transmission occurred from 2 of 3 asymptomatic children with SARS-CoV-2 infection.[94]

[89] Public Health Agency of Sweden, and Finnish Institute for Health and Welfare. *Covid-19 in Schoolchildren - a Comparison between Finland and Sweden*. Sweden, 2020. https://www.folkhalsomyndigheten.se/publicerat-material/publikationsarkiv/c/covid-19-in-schoolchildren/.

[90] Ehrhardt, J, A Ekinci, H Krehl, M Meincke, I Finci, J Klein, B Geisel, C Wagner-Wiening, M Eichner, and SO Brockmann. "Transmission of Sars-Cov-2 in Children Aged 0 to 19 Years in Childcare Facilities and Schools after Their Reopening in May 2020, Baden-Württemberg, Germany." *Eurosurveillance* 25, no. 36 (2020): 2001587. https://dx.doi.org/doi:https://doi.org/10.2807/1560-7917.ES.2020.25.36.2001587.

[91] Stein-Zamir, Chen, Nitza Abramson, Hanna Shoob, Erez Libal, Menachem Bitan, Tanya Cardash, Refael Cayam, and Ian Miskin. "A Large Covid-19 Outbreak in a High School 10 Days after Schools' Reopening, Israel, May 2020." *Eurosurveillance* 25, no. 29 (2020): 2001352. https://dx.doi.org/doi:https://doi.org/10.2807/1560-7917.ES.2020.25.29.2001352.

[92] Szablewski, Christine, Karen Chang, Marie Brown, Victoria Chu, Anna Yousaf, Ndubuisi Anyalechi, Peter Aryee, Hannah Kirking, Maranda Lumsden, Erin Mayweather, Clinton McDaniel, Robert Montierthsonson, Asfia Mohammed, Noah Schwartz, Jaina Shah, Jacqueline Tate, Emilio Dirlikov, Cherie Drenzek, Tatiana Lanzieri, and Rebekah Stewart. "Sars-Cov-2 Transmission and Infection among Attendees of an Overnight Camp — Georgia, June 2020." *MMWR Morb Mortal Wkly Rep 2020* 69 (2020): 1023-25. https://dx.doi.org/http://dx.doi.org/10.15585/mmwr.mm6931e1external.

[93] Link-Gelles, Ruth, Amanda L DellaGrotta, Caitlin Molina, Ailis Clyne, Kristine Campagna, Tatiana M Lanzieri, Marisa A Hast, Krishna Palipudi, Emilio Dirlikov, and Utpala Bandy. "Limited Secondary Transmission of Sars-Cov-2 in Child Care Programs—Rhode Island, June 1-July 31, 2020." *Morbidity and Mortality Weekly Report* 69, no. 34 (2020): 1170.

[94] Lopez, A, M Hill, J Antezano, and et al. "Transmission Dynamics of Covid-19 Outbreaks Associated with Child Care Facilities — Salt Lake City, Utah, April-July 2020." *MMWR Morb Mortal Wkly Rep*. (2020). https://dx.doi.org/http://dx.doi.org/10.15585/mmwr.mm6937e3external

- In Santiago, Chile, a SARS-CoV-2 outbreak affecting 52 people from a large school community was investigated.[95] Antibody positivity rates were 9.9 percent for 1,009 students and 16.6 percent for 235 staff. Teachers were more affected during the outbreak and younger children were at higher infection risk, most likely because index cases were teachers and/or parents from preschool.

These findings demonstrate that children are susceptible to SARS-CoV-2 infection and that they appear to efficiently spread SARS-CoV-2 virus when in overcrowded situations and when community transmission is high. A large South Korean study found children younger than age 10 are less likely than adults to transmit the virus, while older children may transmit it at levels similar to adults.[96] In addition, a recent study found that children younger than 5 years old with mild to moderate COVID-19 may have high viral load [97] [98] suggesting that young children can potentially be important drivers of SARS-CoV-2 spread in the general population. However, how much of this is infectious virus is unknown.

Cross-sectional epidemiological studies show a tendency towards lower proportions of antibodies among children and adolescents than in adults.[99] Although some school studies have shown similar seroprevalence rates between children and adults, suggesting that children are just as likely to get infected as adults.[100] Further research is required to fully understand the role of children in transmission. School-based surveillance studies could help build further knowledge regarding children and SARS-CoV-2 transmission within school settings. Testing using RT-PCR alone, substantially underestimates the true prevalence of infection as seroprevalence studies consistently show higher seroprevelance rates (i.e. evidence of prior exposure to the virus) compared with prevalence on infection by RT-PCR by age group.[101] [102] The reason for this is due to both the extent of RT-PCR testing (not everyone gets tested) and the degree of asymptomatic infection. Public Health England is undertaking COVID-19 surveillance in children attending preschool, primary and secondary schools and will test up to 20,000 pupils and teachers within 100 schools.[103] In Berlin, researchers are undertaking a study in 24 schools that will test a cohort of 20 to 40 pupils and 5 to 10 staff members from each school every 3 months for at least 1 year. The researchers will look for both active infections and antibodies, to map the extent of asymptomatic infections and the threat they pose to students and staff. A similar study started in 138 preschools and elementary schools in Germany.

6. What other countries are doing in terms of ECEC and school mitigation measures

The effectiveness of interventions to reduce the transmission of SARS-CoV-2 within ECEC and school settings

- **The evidence on the effectiveness of school-based interventions on curbing the pandemic or school outbreaks is weak and is currently limited to observational studies and modelling studies which considered the population impact of school closures or reopening.**
- **Modelling studies calibrated with UK and EU data predict the reopening of schools at reduced capacity, particularly for younger children, may not increase the basic reproduction number (R0) greater than one.**

[95] Torres, Juan Pablo, Cecilia Piñera, Verónica R. N. De La Maza, Anne J. Lagomarcino, Daniela R. N. Simian, Bárbara R. N. Torres, Cinthya Urquidi, María Teresa Valenzuela, and Miguel O'Ryan. "Sars-Cov-2 Antibody Prevalence in Blood in a Large School Community Subject to a Covid-19 Outbreak: A Cross-Sectional Study." *Clinical Infectious Diseases* (2020). Accessed 9/14/2020. https://dx.doi.org/10.1093/cid/ciaa955.
[96] Park, Young Joon, Young June Choe, et al., "Contact Tracing During Coronavirus Disease Outbreak, South Korea, 2020."
[97] Heald-Sargent, Taylor, William J. Muller, Xiaotian Zheng, Jason Rippe, Ami B. Patel, and Larry K. Kociolek. "Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2) Levels in Patients with Mild to Moderate Coronavirus Disease 2019 (Covid-19)." *JAMA Pediatrics* 174, no. 9 (2020): 902-03. Accessed 9/9/2020. https://dx.doi.org/10.1001/jamapediatrics.2020.3651.
[98] Heald-Sargent, Taylor, et al., "Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2) Levels in Patients with Mild to Moderate Coronavirus Disease 2019 (Covid-19)."
[99] Torres, Juan Pablo, Cecilia Piñera, et al., "Sars-Cov-2 Antibody Prevalence in Blood in a Large School Community Subject to a Covid-19 Outbreak: A Cross-Sectional Study."
[100] Ismail, Sharif, Vanessa Saliba, Jamie Lopez Bernal, Mary Ramsay, and Shamez Ladhani. "Sars-Cov-2 Infection and Transmission in Educational Settings: Cross-Sectional Analysis of Clusters and Outbreaks in England." *medRxiv* (2020). https://dx.doi.org/https://doi.org/10.1101/2020.08.21.20178574.
[101] European Centre for Disease Prevention and Control. *Covid-19 in Children and the Role of School Settings in Covid-19 Transmission*. Stockholm: ECDC, 2020. https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-schools-transmission-August%202020.pdf.
[102] Ismail, Sharif, Vanessa Saliba, Jamie Lopez Bernal, et al., "Sars-Cov-2 Infection and Transmission in Educational Settings: Cross-Sectional Analysis of Clusters and Outbreaks in England."
[103] PHE. "Study Launched to Monitor Prevalence of Covid-19 in Schools." Last modified 9 June 2020, 2020. Accessed 9 Sept, 2020. https://www.gov.uk/government/news/study-launched-to-monitor-prevalence-of-covid-19-in-schools.

- **As schools reopen, if appropriate physical distancing and hygiene measures are applied, schools are unlikely to be more effective propagating environments than other occupational or leisure settings with similar densities of people.**
- **Decisions on control measures in ECEC and schools and ECEC and school closures/openings should be consistent with decisions on other physical distancing and public health response measures within the broader community.**
- **Widespread testing in ECEC and schools during single cases and outbreaks, including of children without symptoms, could help shape the most effective school policy, especially with regard to the extent of school closures.**

Governments around the world are making decisions to balance the uncertainty and risks of reopening schools against the clear harms associated with prolonged closure. Schools in low-transmission settings could provide sound and socio-emotionally appropriate instruction to all students, in person, in ways that do not put teachers or families at undue risk.[104] Successful school reopening requires plans and policies that support evidence-informed measures like physical distancing, hand-washing, use of masks, and environmental cleaning.

Globally, a variety of approaches have been adopted in relation to the reopening of schools. However, there is a paucity of studies on the effectiveness of these measures in the school setting. A systematic review and meta-analysis by the World Health Organization (WHO) supports physical distancing of one metre or more; use of face masks and eye protection. However, most studies assessed interventions in non-healthcare settings and most of the evidence was reported on SARS and MERS, rather than SARS-CoV-2.[105] Inhaling small airborne droplets is a route of infection, in addition to larger respiratory droplet spread and direct contact with infected people or fomites. While uncertainties exist with regard to the relative contributions of the different transmission routes, preventing airborne transmission is an important part of any strategy to limit the infection risk indoors and also in the school setting. Improved ventilation and avoiding air recirculation and overcrowding are key.[106]

Public Health England undertook a systematic review on published studies and preprints up to 18 June 2020 on the effectiveness of interventions to reduce the transmission of SARS-CoV-2 within school settings and concluded that there is limited and weak evidence from 6 modelling studies. We re-ran this search, and for schools and ECEC for published studies and preprints up to 10 September 2020 with an expanded search strategy that included ECEC and special schools found 2166 published studies and preprints (details of the search can be found in Appendix A).

South Korea had a successful transition from school closure to re-opening with online and offline classes up to August 2020:

- Physical distancing measures were implemented including limiting classroom size, physical distancing for children and staff, hygiene, masks (inside only), plastic barriers, singing, and music classes were online-only.
- The specific method of teaching was determined by each school and depended on the number of students and the amount of community transmission in the local area.
- When a confirmed case was identified at a school, the school would stop offline classes and proceed to online classes during the investigation.
- There was no sudden increase in paediatric SARS-CoV-2 cases after the school opening, and the proportion of paediatric infections remained stable.[107]

Modelling studies (all preprints) attempted to estimate the impact of reopening schools on the population transmission of SARS-CoV-2:

- A modelling study from the UK used social contact data to predict the impact of social distancing policies on Reproductive number (R), with a focus on reopening schools and found that opening primary schools would have a modest impact on R while opening secondary

[104] Levinson, Meira, Muge Cevik, and Marc Lipsitch. "Reopening Primary Schools During the Pandemic." *New England Journal of Medicine* 383, no. 10 (2020): 981-85. https://dx.doi.org/10.1056/NEJMms2024920.
[105] Chu, Derek K., Elie A. Akl, et al.. "Physical Distancing, Face Masks, and Eye Protection to Prevent Person-to-Person Transmission of Sars-Cov-2 and Covid-19: A Systematic Review and Meta-Analysis." *The Lancet* 395, no. 10242 (2020): 1973-87. Accessed 2020/09/08. https://dx.doi.org/10.1016/S0140-6736(20)31142-9.
[106] Morawska, Lidia, Julian W. Tang, William Bahnfleth, Philomena M. Bluyssen, et al., "How Can Airborne Transmission of Covid-19 Indoors Be Minimised?", *Environment international* 142 (2020): 105832-32. https://dx.doi.org/10.1016/j.envint.2020.105832.
[107] Yoon, Yoonsun, Kyung-Ran Kim, Hwanhee Park, So young Kim, and Yae-Jean Kim. "Stepwise School Opening Online and Off-Line and an Impact on the Epidemiology of Covid-19 in the Pediatric Population." *medRxiv* (2020): 2020.08.03.20165589. https://dx.doi.org/10.1101/2020.08.03.20165589.

schools was predicted to have a more significant overall impact; a combination of re-opening both would result in a loss of epidemic control.[108]

- A French study (preprint) estimated that re-opening both primary and secondary schools at the same time and completely would result in the largest increase in SARS-CoV-2 cases compared to other 'phased re-opening' scenarios.[109]
- The importance of trace and testing community cases was highlighted in a UK modelling study (preprint) which estimated that to keep the R0 below 1 and avert a rebound in cases, a phased return of UK schools from June 2020 would require testing 51 percent of symptomatic cases in the community, and tracing 40 percent of their contacts, along with the isolation of symptomatic and diagnosed cases.[110]
- A modelling study (preprint) from Australia assessed the impact of lifting different public health mitigation measures separately on community SARS-CoV-2 transmission.[111] From the 6 policy changes modelled, which included opening of bars and removing working from home, the re-opening of all schools was expected to have the second lowest impact on community SARS-CoV-2 incidence (allowing small social gatherings of less than 10 people was the lowest). The model assumed schools consisted of separate class groups, with no interaction between individuals from other groups.
- Another study (preprint) from Australia also suggested that reopening schools (whilst maintaining social distancing, and with class groups of 20 pupils) without lifting other lockdown restrictions would have little impact on the effective reproductive number.[112] However, re-opening schools while lifting other measures such as home lockdown was associated with an increase. It should be noted that both studies at the time they were undertaken (June 2020) Australia had very low transmission rates.
- A modelling study from the early stages of the pandemic from South Korea, estimated that any school re-opening would lead to additional cases and that school closure was an essential intervention to prevent or mitigate the COVID-19 epidemic.[113] However, this model was based on assumptions early on in the pandemic including a homogenous level of susceptibility and transmission across all age groups up to 19 years of age.

There are a number of limitations to modelling studies, including that they are usually run in controlled environments that may not accurately reflect the behaviours that are observed in real life, and that assumptions have to be made when evidence or data are lacking, particularly related to the role of children in transmission, which still remains uncertain. Hence, mathematical modelling is not sufficient to determine the actual risk to school-aged children and the teachers and caregivers in their lives.[114]

Harvard School of Public Health have written the "Risk Reduction Strategies for Reopening Schools" which provides guidance regarding best practices on the general operations of buildings in an effort to reduce the risk of disease transmission, specifically for SARS-CoV-2.[115] This report summarises a range of control strategies that should be considered in the discussion surrounding schools reopening, including:

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[108] Brooks-Pollock, Ellen, Jonathan M. Read, Angela R. McLean, Matt J. Keeling, and Leon Danon. "Using Social Contact Data to Predict and Compare the Impact of Social Distancing Policies with Implications for School Re-Opening." *medRxiv* (2020): 2020.07.25.20156471. https://dx.doi.org/10.1101/2020.07.25.20156471.
Di Domenico, Laura, Giulia Pullano, Chiara E. Sabbatini, Pierre-Yves Boëlle, and Vittoria Colizza. "Expected Impact of Reopening Schools after Lockdown on Covid-19 Epidemic in Île-De-France." *medRxiv* (2020): 2020.05.08.20095521. https://dx.doi.org/10.1101/2020.05.08.20095521.
Keeling, Matt J., Michael J. Tildesley, Benjamin D. Atkins, Bridget Penman, Emma Southall, Glen Guyver-Fletcher, Alex Holmes, Hector McKimm, Erin E. Gorsich, Edward M. Hill, and Louise Dyson. "The Impact of School Reopening on the Spread of Covid-19 in England." *medRxiv* (2020): 2020.06.04.20121434. https://dx.doi.org/10.1101/2020.06.04.20121434.
Panovska-Griffiths, Jasmina, Cliff Kerr, Robyn Margaret Stuart, Dina Mistry, Daniel Klein, Russell M. Viner, and Chris Bonell. "Determining the Optimal Strategy for Reopening Schools, Work and Society in the Uk: Balancing Earlier Opening and the Impact of Test and Trace Strategies with the Risk of Occurrence of a Secondary Covid-19 Pandemic Wave." *medRxiv* (2020): 2020.06.01.20100461. https://dx.doi.org/10.1101/2020.06.01.20100461.

[109] Di Domenico, Laura, Giulia Pullano, et al., "Expected Impact of Reopening Schools after Lockdown on Covid-19 Epidemic in Île-De-France."

[110] Panovska-Griffiths, Jasmina, Cliff Kerr, et al., "Determining the Optimal Strategy for Reopening Schools, Work and Society in the Uk: Balancing Earlier Opening and the Impact of Test and Trace Strategies with the Risk of Occurrence of a Secondary Covid-19 Pandemic Wave."

[111] Scott, Nick, Anna Palmer, Dominic Delport, Romesh Abeysuriya, Robyn Stuart, Cliff C. Kerr, Dina Mistry, Daniel J. Klein, Rachel Sacks-Davis, Katie Heath, Samuel Hainsworth, Alisa Pedrana, Mark Stoove, David P. Wilson, and Margaret Hellard. "Modelling the Impact of Reducing Control Measures on the Covid-19 Pandemic in a Low Transmission Setting." *medRxiv* (2020): 2020.06.11.20127027. https://dx.doi.org/10.1101/2020.06.11.20127027.

[112] McBryde, Emma Sue, James M. Trauer, Adeshina Adekunle, Romain Ragonnet, and Michael T. Meehan. "Stepping out of Lockdown Should Start with School Re-Openings While Maintaining Distancing Measures. Insights from Mixing Matrices and Mathematical Models." *medRxiv* (2020): 2020.05.12.20099036. https://dx.doi.org/10.1101/2020.05.12.20099036.

[113] Kim, Soyoung, Yae Jean Kim, Kyong Ran Peck, and Eunok Jung. "School Opening Delay Effect on Transmission Dynamics of Coronavirus Disease 2019 in Korea: Based on Mathematical Modeling and Simulation Study." *Journal of Korean medical science* 35, no. 13 (2020): e143-e43. https://dx.doi.org/10.3346/jkms.2020.35.e143.

[114] European Centre for Disease Prevention and Control (ECDC). *Covid-19 in Children and the Role of School Settings in Covid-19 Transmission*. Stockholm: ECDC, 2020.

[115] Jones, E, A Young, K Clevenger, P Salimifard, E Wu, M Lahaie Luna, M Lahvis, J Lang, M Bliss, P Azimi, J Cedeno-Laurent, C Wilson, and J Allen. *Healthy Schools: Risk Reduction Strategies for Reopening Schools*: Harvard T.H. Chan School of Public Health Healthy Buildings program, 2020. https://schools.forhealth.org/wp-content/uploads/sites/19/2020/06/Harvard-Healthy-Buildings-Program-Schools-For-Health-Reopening-Covid19-June2020.pdf

- Healthy policies: Building a culture of health, safety, and shared responsibility
- Healthy buildings: Breathing clean air in the school building
- Healthy classrooms: Following safe practices in classrooms
- Healthy schedules: Moving between rooms and locations safely
- Healthy activities: Enjoying modified activities

Additionally, Viner et al.[116] proposed 5 key principles to guide the reopening of schools:

- Doing so in a staged fashion
- Incorporating distancing measures
- Infection control measures
- Protecting teachers and vulnerable students
- As well as research and evaluation.

More research and evaluation is needed on the implementation of non-pharmaceutical interventions (e.g., social distancing, masks, hand hygiene, and use of cohorting) used in ECEC and schools to determine which strategies are the most effective.[117] Such research would improve understanding of the impact of mitigation strategies on the risk of SARS-CoV-2 transmission in ECEC and schools.

How other countries are opening ECEC and schools up safely

The single best policy to support school reopening prior to the development of a vaccine or treatment is the suppression of COVID-19 to near zero case incidence in the community. This can be achieved via universal mask wearing, rigorous social distancing, reduction or elimination of indoor gatherings, and timely Testing, Tracing and Supported Isolation.[118] Additionally, various policies have been adopted by governments around the globe for schools following these basic principles. The US Centers for Disease Control and Prevention (CDC) recommends specific strategies based on the level of community transmission, using a traffic light approach in order to keep schools open as long as possible[119]. The Harvard Global Health Institute's "The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces"[120] recommends that schools open up based on a traffic light system according to the community incidence shown in Figures 7 and 8. Noting that this COVID-19 risk level from the US would have placed Victoria in the orange zone during at the peak of the epidemic (11 notifications per 100,000 population), and in the green zone at the time of writing this report.

Covid Risk Level	Case Incidence	
Red	>25	daily new cases per 100,000 people
Orange	10<25	daily new cases per 100,000 people
Yellow	1<10	daily new cases per 100,000 people
Green	<1	daily new case per 100,000 people

***Figure 7**. Creating a pandemic resilient learning space: COVID-19 risk level and community case incidence. Source: The Harvard Global Health Institute's "The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces"*[121]

[116] Viner, Russell M, et al., "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review."
[117] McCartney, Margaret. "We Need Better Evidence on Non-Drug Interventions for Covid-19." BMJ 370 (2020): m3473. https://dx.doi.org/10.1136/bmj.m3473.
[118] Harvard Global Health Institute. *The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces*.
[119] Centers for Disease Control and Prevention. "Preparing K-12 School Administrators for a Safe Return to School in Fall 2020." U.S. Department of Health & Human Services. Last modified 26 Aug, 2020. Accessed 9 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/prepare-safe-return.html.
[120] Harvard Global Health Institute. *The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces*.
[121] Harvard Global Health Institute. *The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces*.

Risk Levels	Strategy for Pandemic Resilient Teaching and Learning
Red	Stay-at-home orders in place; all learning remote for all learners; districts, states, and federal government invests in remote learning.
Orange	**1st priority for re-opening:** Grades preK-5 and in-person special education services at grade levels preK-8 open if conditions for pandemic resilient teaching and learning spaces can be achieved at scale; districts, states, and federal government invest in healthy buildings and healthy classrooms; in the absence of conditions for pandemic resilient teaching and learning spaces, schools continue with remote learning. **2nd priority for re-opening:** Grades 6-8 and in-person special education services at grade levels 9-12 open if conditions for pandemic resilient teaching and learning spaces can be achieved at scale; districts, states, and federal government invest in healthy buildings and healthy classrooms; in the absence of conditions for pandemic resilient teaching and learning spaces, schools continue with remote learning. **Not a priority for re-opening:** Grades 9-12 maintain remote learning for all learners; districts, states, and federal government invest in remote learning.
Yellow	**1st priority for re-opening:** Grades preK-5 and in-person special education services at grade levels preK-8 open if conditions for pandemic resilient teaching and learning spaces can be achieved at scale; districts, states, and federal government invest in healthy buildings and healthy classrooms; in the absence of conditions for pandemic resilient teaching and learning spaces, schools continue with remote learning. **2nd priority for re-opening:** Grades 6-8 and in-person special education services at grade levels 9-12 open if conditions for pandemic resilient teaching and learning spaces can be achieved at scale; districts, states, and federal government invest in healthy buildings and healthy classrooms; in the absence of conditions for pandemic resilient teaching and learning spaces, schools continue with remote learning. In-person opportunities for special needs students at grade-levels preK-8 are also included. **3rd priority for re-opening:** If sufficient pandemic resilient learning space is available AFTER allocation to K-8, grades 9-12 open on a hybrid schedule, with only a subset of students on campus at any particular point of time to facilitate de-densification; districts, states, and federal government invest in healthy buildings and healthy classrooms AND in remote learning.
Green	All schools open if conditions for pandemic resilient teaching and learning spaces can be achieved at scale; districts, states, and federal government invest in healthy buildings and healthy classrooms

***Figure 8**. Guide for using incidence levels to help think about pandemic resilient schools.*
The Harvard Global Health Institute's "The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces"[122]

[122] Harvard Global Health Institute. *The Path to Zero and Schools: Achieving Pandemic Resilient Teaching and Learning Spaces.*

A summary of approaches used, including specific examples of action taken by individual countries with more successful programs are shown in Figure 9, and additionally in Appendix B (other government guidelines from around the world).

Country	Physical distance	Pods	No singing, wind instruments, PE	Ventilation	Enhanced cleaning	Hygiene	Masks
Australia-NSW	✓	✓	✓		✓	✓	
Canada	✓				✓	✓	Considered
Germany	✓	✓		✓	✓	✓	Varies
Hong Kong	✓		✓		✓	✓	✓
Japan	✓	✓		✓	✓	✓	✓
Singapore	✓	✓			✓	✓	✓
South Korea	✓	✓			✓	✓	✓
Taiwan	✓	✓			✓	✓	✓
Vietnam	✓				✓	✓	✓

***Figure 9**. Summary of ECEC and school mitigation strategies.*
Some countries may have additional mitigation strategies not listed here.

Various policy approaches have been deployed that can be termed as 'partial closure', including restricting class sizes, opening schools only for specific age/year groups, organising lessons with staggered timetables or alternating student cohorts between remote and in-school teaching.[123] Many schools have also incorporated staggered schedules to eliminate crowding. Physical distancing in and out of the classroom is common practice.

- In Japan, students attend class on alternate days to limit the number of students at any given time.
- Some German school students alternate between in-person and online classes.[124]
- Denmark assigned children to small groups of 12 that could congregate at recess. They staggered students' reentry in waves, with limited class sizes and using other social distancing measures. Younger students (under age 12) returned first based on their lower health risk and need for more supervision than older students. Class sizes were reduced to allow physical distancing.
- Schools in the Netherlands reduced class sizes in half but didn't enforce distancing among students under the age of 12 years old when they reopened in April. They recently announced that anyone under age 17 did not need to distance.
- Schools in Switzerland use tape on floors to mark adequate space between desks. To further limit contact, many Swiss schools reduced class sizes by 50 percent.[125]
- Italy plans to introduce desks that only seat one person (normally they use 2 person desks).
- The CDC points to "bubbles" or "pods" as a potential strategy for US schools. "Pods" have allowed school and health officials to quickly isolate groups of students who may have been exposed without disrupting the entire school.
- Denmark has also found creative ways to give those groups as much space and fresh air as possible, with some classes being taught in a graveyard. Some classes in Belgium meet in churches to keep students distanced.
- Finland has kept normal class sizes, but prevents classes from mixing with one another. From September secondary students are attending alternate weeks to reduce class size to 50 percent.
- Quebec, which reopened many elementary schools in May with strict distancing, allows children to socialise freely in groups of 6; each group must stay one metre away from other groups of students and 2 metres away from teachers. Daycares abandoned all distancing rules for children aged 5 and under. Older students are advised to stay at least 1 meter away from others while inside, but outside they can play freely with others in their class.[126]

[123] Melnick, H, L Darling-Hammond, M Leung, C Yun, A Schachner, S Plasencia, and N Ondrasek. "Reopening Schools in the Context of Covid-19: Health and Safety Guidelines from Other Countries (Policy Brief)." Learning Policy Institute. 2020. https://learningpolicyinstitute.org/product/reopening-schools-covid-19-brief.
[124] Barton, Tyler, and Anand Parekh. "Reopening Schools: Lessons from Abroad."
[125] Barton, Tyler, and Anand Parekh. "Reopening Schools: Lessons from Abroad." The Commonwealth Fund. 2020. https://www.commonwealthfund.org/blog/2020/reopening-schools-lessons-abroad
[126] Barton, Tyler, and Anand Parekh. "Reopening Schools: Lessons from Abroad."

Face masks vary by country. In China, South Korea, Japan, and Vietnam, where masks are already widely accepted and worn by many, masks are removed only for lunch, when children are separated by glass or plastic partitions. Israel requires masks for children older than age seven outside the classroom, and for children in fourth grade and above all day. In some schools in Germany, students wear masks in hallways or bathrooms, but can remove them when seated at their distantly spaced desks. Austria reopened with this approach, but abandoned masks for students a few weeks later, when little spread was observed within schools. In Canada, Denmark, Norway, the United Kingdom, and Sweden, mask wearing is optional for both students and staff.[127]

Singapore and Japan rely on daily temperature checks, although fever is not always a COVID-19 symptom among children. Current CDC guidance recommends screening children prior to school arrival, which involves either parents or staff taking their temperatures. Non-contact infrared thermometers measure skin (peripheral) temperature without physical contact, which offers a convenient option for temperature checking large numbers of children. But their readings can be affected by factors such as outdoor temperature, where on the body the thermometer is aimed, and distance from the subject. Fever reducing medications, such as paracetamol, can lower a child's temperature. As many children with SARS-CoV-2 infection don't have symptoms or a fever, or have a fever detected by the non-contact infrared thermometer, fever screening may miss more than half of infected children in schools. Combined, these factors indicate non-contact infrared thermometers may not be very reliable in detecting a fever (regardless of whether or not the fever is related to COVID-19). However, at the very least, this tool provides a visible important reminder to parents, staff and students of the risk of COVID-19, and for children to remain at home if they're unwell.[128]

Certain interventions require additional research. Some countries require routine SARS-CoV-2 testing for students to attend in-person classes. In some German states, students are tested every 4 days.

Managing an ECEC or school outbreak

If a SARS-CoV-2 case occurs in an ECEC or school, there is a lack of information as to whether to close the classroom or shut the entire ECEC or school for an extended period. Norway and other countries have implemented mandatory contact tracing of confirmed cases to help assess when to safely reopen schools. Some schools have favoured isolating only close contacts. In Germany, for example, classmates and teachers of an infected student are sent home for 2 weeks, but other classes continue. Until the summer holiday break, Quebec generally did the same; at least 53 students and teachers tested positive after many schools reopened in May, according to news reports, but officials believed many of those infections were contracted in the community. Taiwan, which has largely suppressed the virus, kept schools open after one case but would close the entire school for 2 or more cases, a situation that has not occurred yet. In Israel, schools close for a single case, and close contacts of every infected individual are tested and quarantined. By mid-June, 503 students and 167 staff had been infected, and 355 schools had closed temporarily, which is a small proportion of the 5000 schools across Israel.

[127] Barton, Tyler, and Anand Parekh. "Reopening Schools: Lessons from Abroad."
[128] Russell, Fiona, and Kathleen Ryan. "Will School Temperature Checks Curb the Spread of Coronavirus?" (24 July 2020). https://theconversation.com/will-school-temperature-checks-curb-the-spread-of-coronavirus-142999

Methods to analyse DHHS data

The Victorian DHHS conducts in-depth interviews with all notified cases (or their guardian) of SARS-CoV-2 to identify potential exposure risks, clinical history, and onward transmission. All cases and close contacts have the following information collected: name, date of birth, isolation date, and when available, SARS-CoV-2 PCR test date and results, and relationship to known outbreaks (events). Additional information on cases includes address, symptoms (yes/no, onset date, and description), clinical outcomes. A 14 day history prior to diagnosis, including attendance at school/work was recorded, however due to increased workload in the second wave this was reduced to 2 day history with additional history only recorded when needed. To limit onward transmission, all confirmed cases are required to isolate until community clearance is confirmed and all close contacts are required to isolate for 14 days following last exposure with a confirmed case. Close contacts are advised to test if any symptoms develop and are currently encouraged to undergo testing on day 11 of their quarantine period regardless of symptoms. DHHS outbreak teams identify potential SARS-CoV-2 outbreaks in schools and early childhood settings, as well as elsewhere in the community, and undertake a number of public health actions to limit transmission. No serology is routinely undertaken.

Data sources

The core dataset for this project is the Public Health Events Surveillance System (PHESS), supplemented with additional data from outbreaks management. PHESS contains data from detailed interviews as well as from laboratory testing, routine monitoring related to home isolation, hospital admissions, and outbreak investigations. Data are updated continuously, extracted daily, and analysed in Stata, R, and PowerBI. The data which form the basis of this analysis are usually managed through the outbreaks reporting process.

Analysis

Detailed descriptive analyses for this report were conducted according to the priorities identified by DHHS, DET and the research team. The priority topics identified for this report included:

- The progression of the second phase of the SARS-CoV-2 epidemic in Victoria over time and its impact on ECEC and schools;
- The patterns seen in specific events in terms of numbers and demographics of cases and contacts;
- The geographic distribution of cases in children and adults, of cases associated with outbreaks in ECEC and schools;
- Analysis of the clinical profile of SARS-CoV-2 among confirmed cases;
- The risk of transmission from and to staff and students in ECEC and schools;
- The uptake and results of testing among contacts associated with educational events during different phases of the epidemic and in different settings; and
- Factors associated with the identification of secondary cases after a primary case occurred in an ECEC or school.

Analyses were stratified by setting and by age group. The ECEC and schools included in this analysis are ECEC, primary schools, secondary schools, 'mixed' level schools (e.g. Prep-12, Prep-9), and schools for children with special needs ('special schools').

Children were stratified into age groups which correspond to ECEC and schools: 0-5 years, 6-12 years, and 13-18 years (while recognising that 5 and 12 years of age are transitional ages). For more detailed analysis related to age, we stratified further to aged 0-5 years, 6-12 years, 13-15 years and 16-18 years. We have included 18 year olds in the 'adolescent' age group in recognition that many 18 year olds are enrolled at school, despite usually being categorised as adults in demographic statistics.

Some individuals are counted in the statistics for multiple outbreaks, for example a teacher might be associated with an outbreak in their workplace but also to an outbreak in their child's ECEC. All outbreaks data in this report must be interpreted with this in mind.

Results are reported to two significant figures (for example '83 percent' and '1.8 percent').

Data management were performed in Stata and R. Descriptive analysis was performed in a combination of Stata, R and PowerBI.

Definitions

An **'event'** refers to a potential SARS-CoV-2 exposure at an ECEC or school, and encompasses both **'complex cases'** (a single confirmed case, or multiple cases from the same household) and **'outbreaks'** (multiple cases from different households at the same ECEC or school).

The term **'ECEC'** is used throughout this report to refer to early childhood education and care, including some services which include older children such as after school care or school holiday programs.

A **'case'** is a person infected with SARS-CoV-2 confirmed by RT-PCR.

A **'contact'** means someone who may have been exposed to SARS-CoV-2 but who did not test positive for SARS-CoV-2 infection, unless otherwise specified, for example '9 contacts later tested positive'. Any contact who later became a case was listed as a case only. This definition was used based on the way the DHHS data is collated and reported.

Cases may be **'associated with an event'** in ECEC or schools in a number of different ways – being associated does not necessarily indicate that the person caught the virus in ECEC or a school. For example, if a parent transmits SARS-CoV-2 to their child, and the child then attends school while potentially infectious, both the parent and the child are associated with the event at the school. Conversely, if a child catches SARS-CoV-2 at school and then transmits it to their parent, their parent would also be associated with the event at the school. This must be borne in mind when interpreting the number of cases associated with events in ECEC or schools – many of these cases will have been acquired in the community or in households.

A **'second generation case'** is a case who caught SARS-CoV-2 from someone who caught it via an outbreak. For example, if a child acquired SARS-CoV-2 infection at school and transmitted it to their parent, their parent would be a second generation case associated with the school.

The **'exposure site'** is the school or ECEC where the event occurred.

The **'period of interest'** for this analysis is from the diagnosis of the first SARS-CoV-2 case in Victoria on 25 January to 31 August 2020 (inclusive). Many figures are restricted to the period from March onwards, as there were no cases associated with ECEC and schools in January or February.

The **'first identified case'** in an event is the staff or student with the earliest symptom onset, or earliest diagnosis date in the case of people who were asymptomatic. This person may have been the first person to bring SARS-CoV-2 into the educational setting, or they could have acquired it from someone else within the setting who was not diagnosed.

People may be **'upstream'** of an incident (the first identified case in a staff member or a student at a school, and any household members with an earlier symptom onset or diagnosis date), or **'downstream'** (staff, students and others diagnosed after the first case, including those diagnosed later who may have acquired SARS-CoV-2 from a common source).

Findings

DHHS data analysis on ECEC and school events

Overview of all SARS-CoV-2 cases in Victoria

There were 19,109 confirmed SARS-CoV-2 cases in Victoria from the beginning of the epidemic (25 January 2020) until 31 August 2020. Of these, 14 percent were children aged 0-18 and 86 percent were adults. The epidemic was concentrated in Melbourne; 93 percent of cases lived in metropolitan Melbourne, 6 percent lived in regional Victoria, and 1 percent were interstate residents or did not have a valid address recorded. Overall, there were slightly more women diagnosed than men (52 percent vs 48 percent of all cases), however this pattern was reversed in children. The age and sex distribution of all confirmed cases in Victoria is shown in Figure 10.

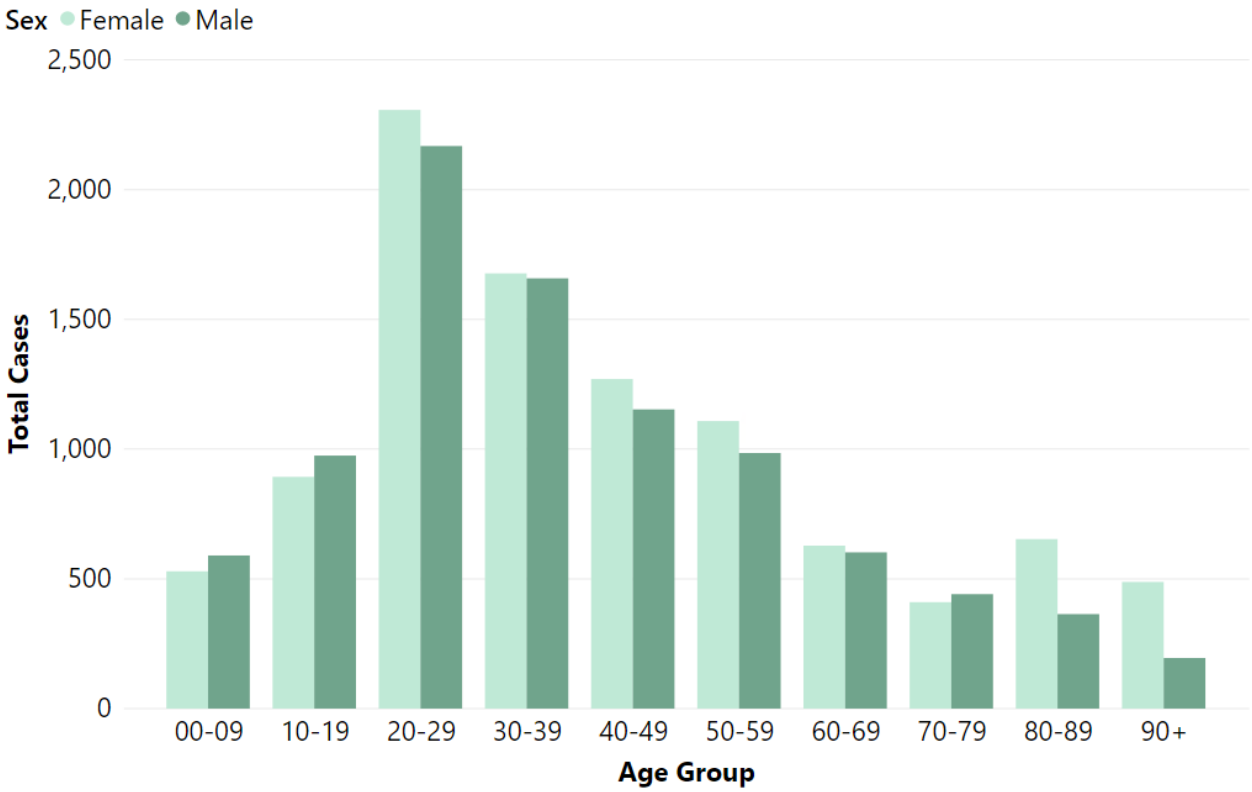


***Figure 10**. Total confirmed cases of SARS-CoV-2 in Victoria, stratified by ten year age group and sex.*

SARS-CoV-2 cases in Victorian children

There were 2,673 children aged 0-18 years diagnosed with SARS-CoV-2 infection in Victoria from the beginning of the epidemic until 31 August 2020. Cases in children mirrored the total number of community cases throughout the epidemic, peaking around the same time as transmission was peaking in the broader community. Cases in children occurred against a backdrop of risk mitigation measures, such as remote learning, that were supported by DET and changed in response to the changing epidemiology and emerging evidence.

Of all 2,673 children aged 0-18 years with SARS-CoV-2 infection in Victoria, 779 (29 percent) were associated with schools or ECEC. Not all children associated with outbreaks at ECEC or schools were students there – this number also includes the children of staff and social contacts of students and

staff, older adolescent staff at ECEC and schools, and other children who may be second or third generation cases associated with outbreaks that started in ECEC or schools.

In the first phase of the epidemic when most cases were acquired through travel, there were comparatively fewer cases in children, which reflects the age of returning travelers. In the second phase from 1 July onwards, which was driven by community transmission, cases among children were more common. This upsurge also coincided with ECEC and school closures under Stage 4 restrictions on 2 August, whereby ECEC and schools were closed for all except for vulnerable children and those whose parents were permitted workers.

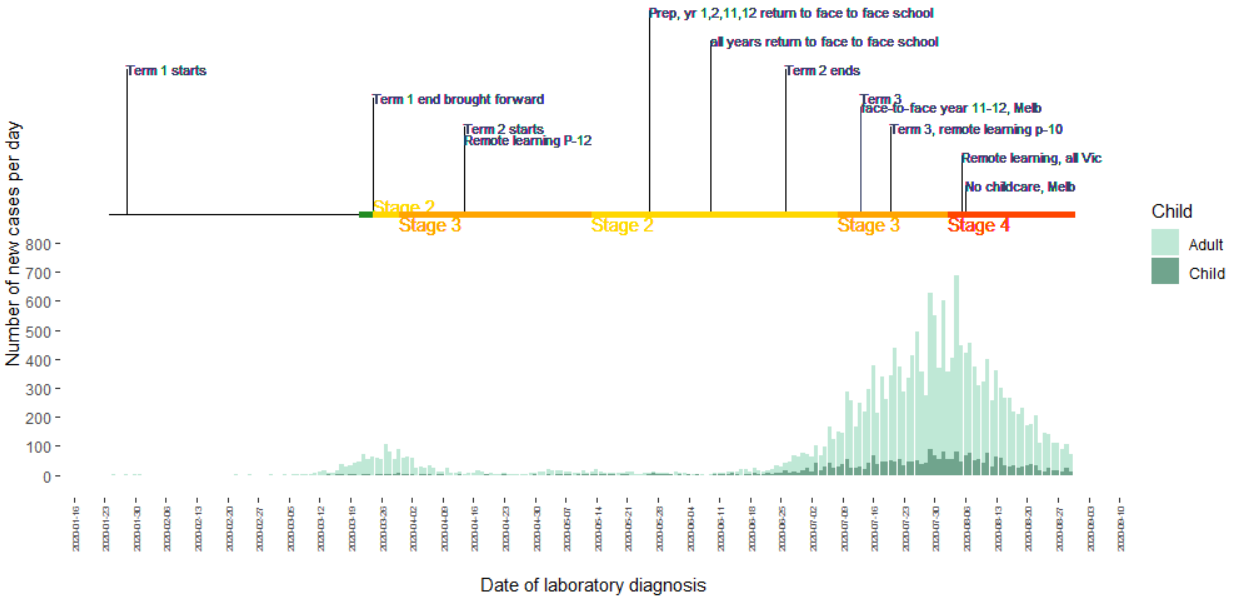


***Figure 11**. Victorian epidemiology curve with dates of restrictions related to ECEC and school attendance, January - August 2020.*

Of the 2,673 Victorian children infected with SARS-CoV-2, 24 percent were aged 0-5 years, 34 percent were aged 6-12 years, and 42 percent were aged 13-18 years (Figure 12).

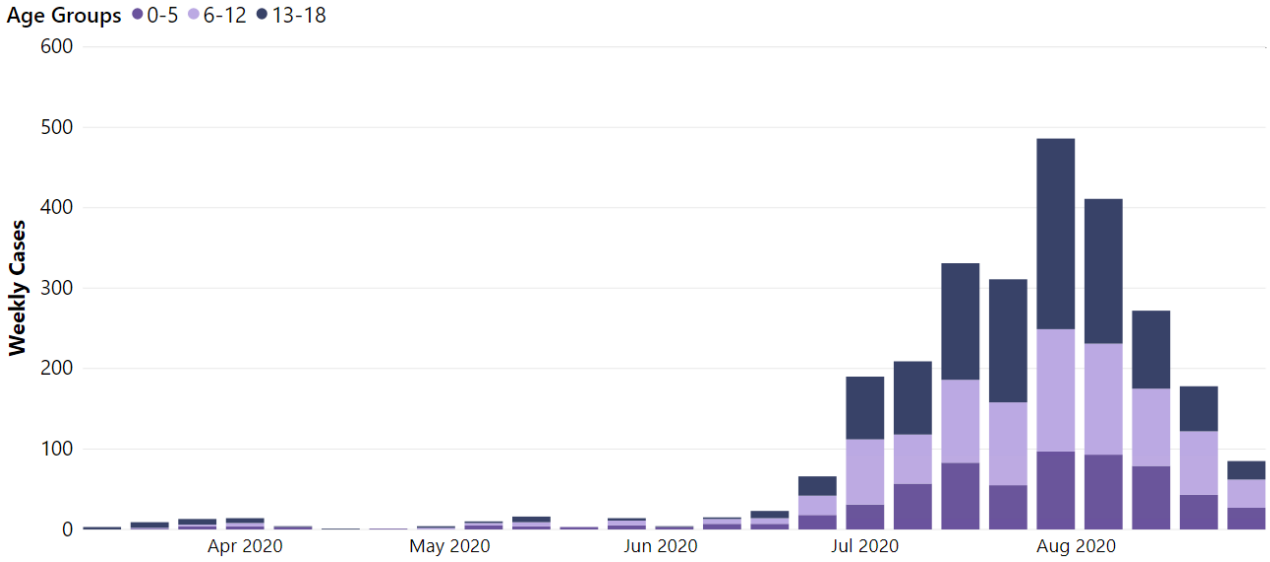


***Figure 12**. Epidemiology curve of confirmation date of all children with SARS-CoV-2 infection in Victoria, March-August 2020, by age group.*

There were more cases confirmed among adolescents than younger children (Figure 13), and slightly more boys were diagnosed than girls (53 vs 47 percent).

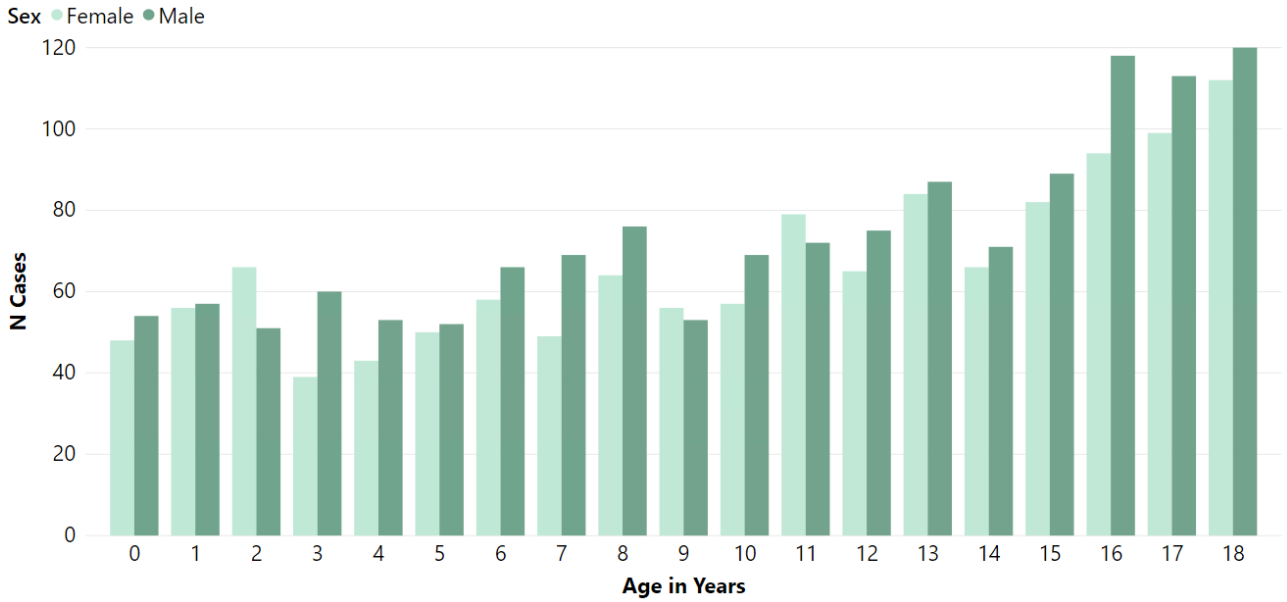


***Figure 13**. SARS-CoV-2 infections among children aged 0-18 years by sex and single year of age.*

Geographic distribution

Like adults, the overwhelming majority of SARS-CoV-2 infections in children occurred in metropolitan Melbourne (93 percent, Figure 14). As with adults, there has been a concentration of cases among children in western Melbourne local government areas (LGAs).

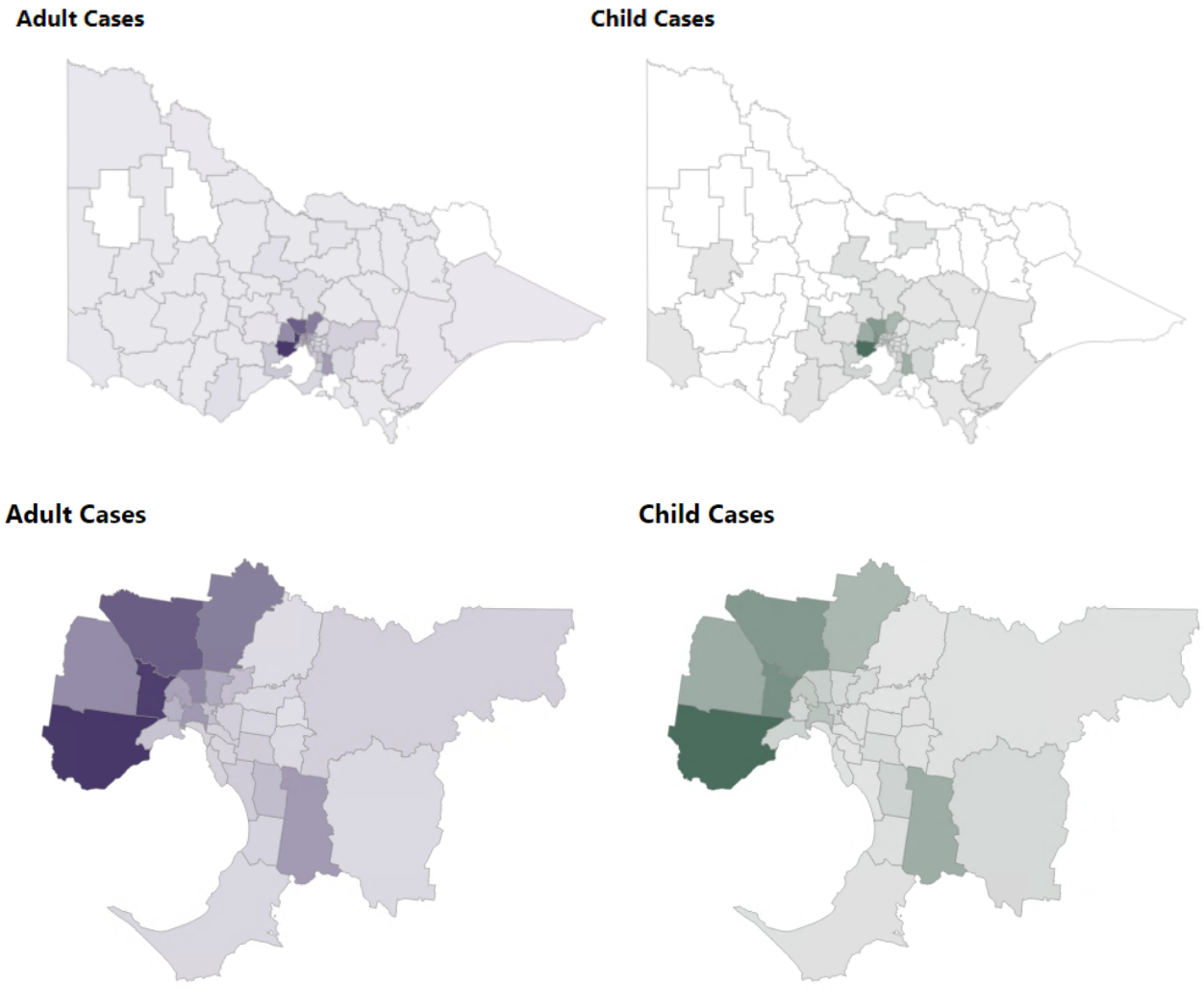


***Figure 14**. Geographic distribution of SARS-CoV-2 infections among children and adults by Local Government rea, Victoria and Metropolitan Melbourne.*
(White in some regional Victorian LGAs indicates zero cases reported in children, darkest purple and green indicate higher numbers.)

Confirmed cases in children associated with outbreaks

Of the 2,673 Victorian children infected with SARS-CoV-2, 1,365 (51 percent) were associated with at least one outbreak either directly or indirectly. Children were most commonly associated with outbreaks in ECEC and schools, however there were also 153 children associated with outbreaks in aged care and 301 associated with outbreaks in workplaces (Figure 15). The same child may be associated with multiple outbreaks, depending on their personal history, for example they might be associated with an outbreak at their parent's workplace.

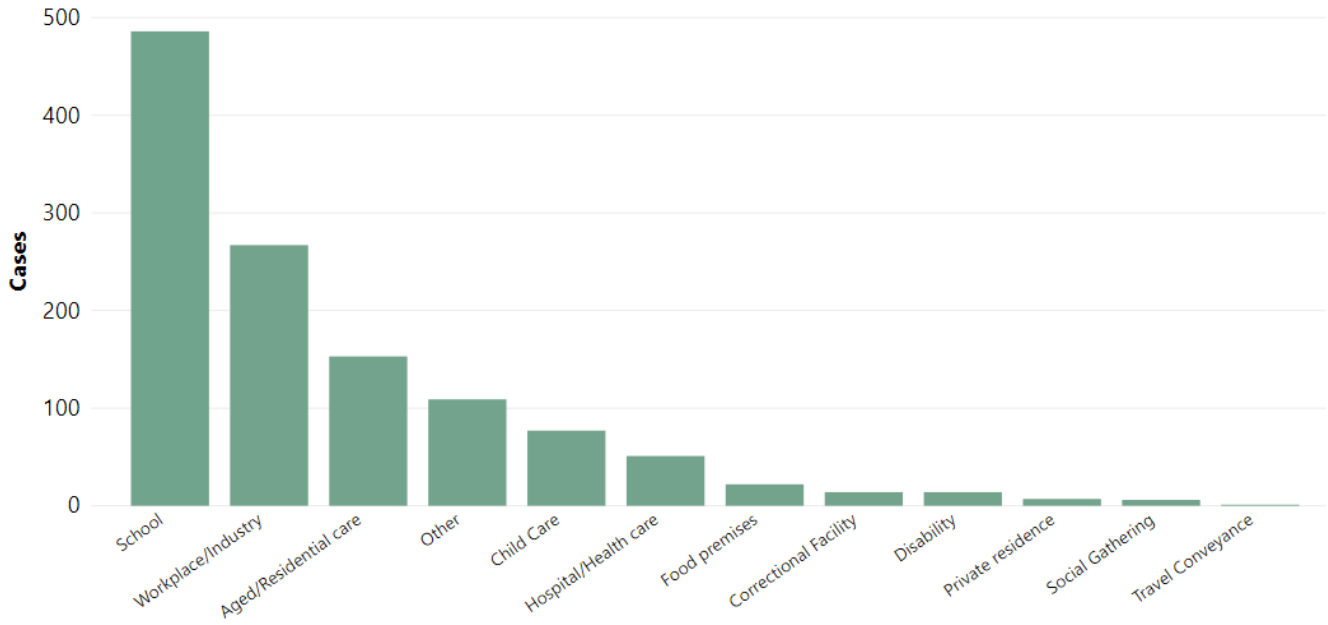


***Figure 15**. Confirmed SARS-CoV-2 cases among children associated with any SARS-CoV-2 outbreak in Victoria. *Note that some children will be associated with more than one outbreak.*

Children were more likely to acquire SARS-CoV-2 from contacts with a confirmed case compared with adults (82 vs 71 percent). Correspondingly, children were less likely than adults to acquire infection from an unknown source, so called 'mystery cases' (17 percent of children compared to 24 percent of adults). Children were also much less likely to have acquired infection overseas (2 percent of children compared to 6 percent of adults), Figure 16.

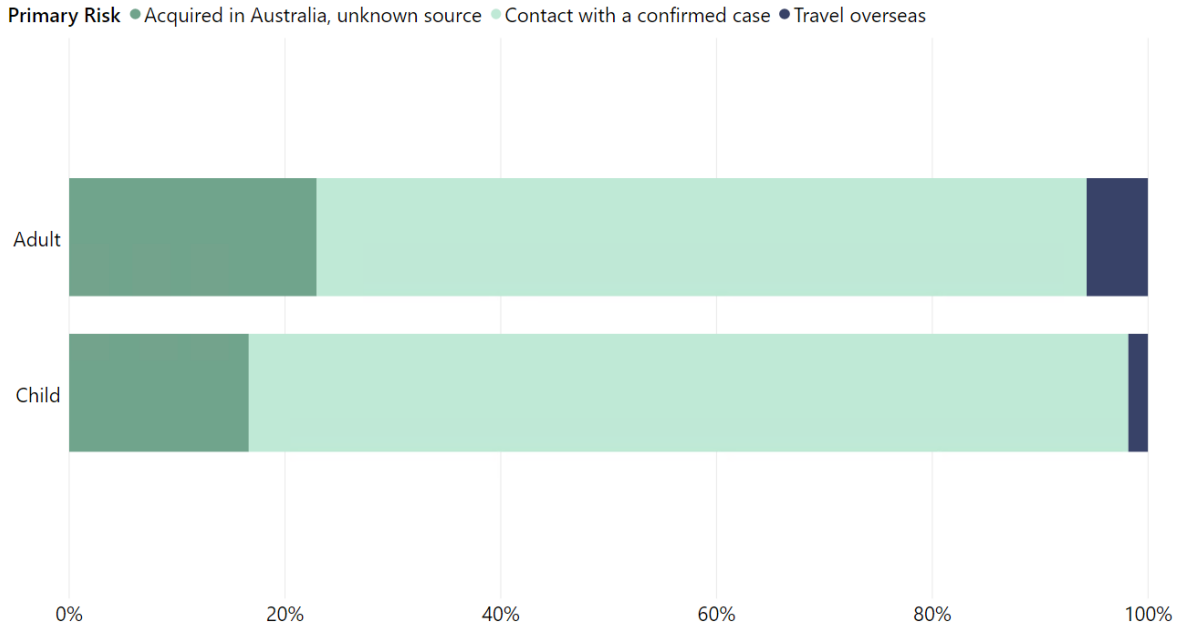


***Figure 16**. Primary epidemiological risk for SARS-CoV-2 infection among children and adults.*

Clinical outcomes of all cases in Victoria

Compared to adults, children were much more likely to be asymptomatic: 33 percent of children reported no symptoms, compared to only 17 percent of adults. Of the 2,673 Victorian children infected with SARS-CoV-2, 49 (1.8 percent) were admitted to hospital at some stage (Figure 17). Of these, 27 (55 percent) were aged 0-5. Not all hospitalisations were due to the clinical consequences of COVID-19 itself - hospitalisations for other reasons are also recorded, including hospitalisation prior to COVID-19 diagnosis in the case of healthcare acquired cases. No children died from COVID-19 in Victoria during the period of this analysis.

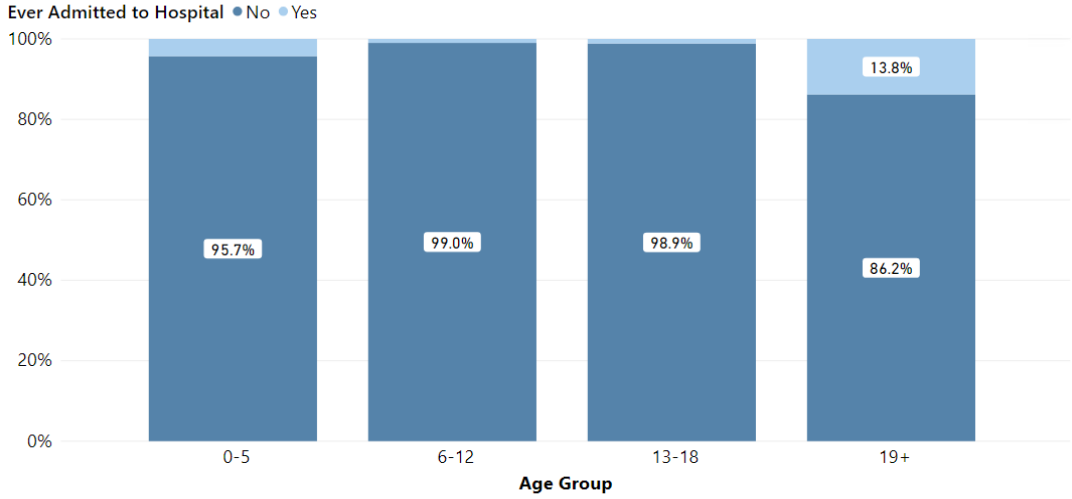


***Figure 17**. Hospital admissions among all children and adults infected with SARS-CoV-2 in Victoria.*

Events in Victorian ECEC and schools

During the period of interest, there were a total of 343 events involving ECEC or schools (Table 3). Among all events, 229 (67 percent) involved a single case with no secondary cases from other

households identified (termed a 'complex case' by DHHS). There were 114 outbreaks (events involving 2 or more cases from different households) in ECEC and schools. Among these there were 90 outbreaks with 5 or less cases, and 12 outbreaks with 6-10 cases. There were 26 large outbreaks involving more than 10 cases each, representing 7.6 percent of all events in ECEC or schools. Two outbreaks involved more than 50 cases. Of these larger outbreaks, 6 occurred in ECEC and 20 occurred in schools.

Secondary schools accounted for the largest numbers of cases and other contacts. Events in secondary schools were also more likely to become outbreaks: 24 percent of events in ECEC and 30 percent of events in primary schools became outbreaks, compared to 41 percent of events in secondary schools and 48% of events in mixed level (e.g. prep-12) schools.

***Table 3**. Number of all known events (n=343) in Victorian ECEC and schools and all associated cases and contacts, January - August 2020.*

Setting type	Events	Outbreaks (% events)	Cases	Contacts	All individuals*
ECEC	113	28 (25%)	381	4,012	4,393
Primary	87	26 (30%)	303	2,778	3,081
Mixed level	40	19 (48%)	406	4,378	4,784
Secondary	95	39 (41%)	554	6,857	7,411
Special	8	2 (25%)	40	283	323
All settings	*343*	*114 (33%)*	*1,635*	*18,215*	*19,850*

*Note that the same individual may be associated with multiple outbreaks, so subtotals may exceed grand totals

There were 1,635 confirmed cases and 18,215 other contacts associated with events in ECEC and schools up until 31 August 2020. Ninety-one percent of cases (n = 1,494) and 84 percent of all contacts (n = 15,254) were associated with events in ECEC and schools in July and August, highlighting the substantial logistical challenges of managing events in ECEC and schools when community transmission is high. It should be noted that many cases associated with events in ECEC and schools would have been acquired in households or in the community, for example cases in the households of students or staff who may have taken SARS-CoV-2 into ECEC or schools, or who may have acquired their infection at school and then passed it on to second generation cases.

There were 7,501 contacts associated with events involving a single confirmed case ('complex cases'), and 11,196 contacts associated with outbreaks (446 individuals were associated with both a complex case and an outbreak).

Some transmission continued after schools were closed during stage 4 restrictions, as transmission associated with outbreaks can continue to occur in households and other settings after the exposure site itself is closed. This increase in cases from July and subsequent decline in August follows the same pattern in cases in the broader community in Victoria (Figure 18).

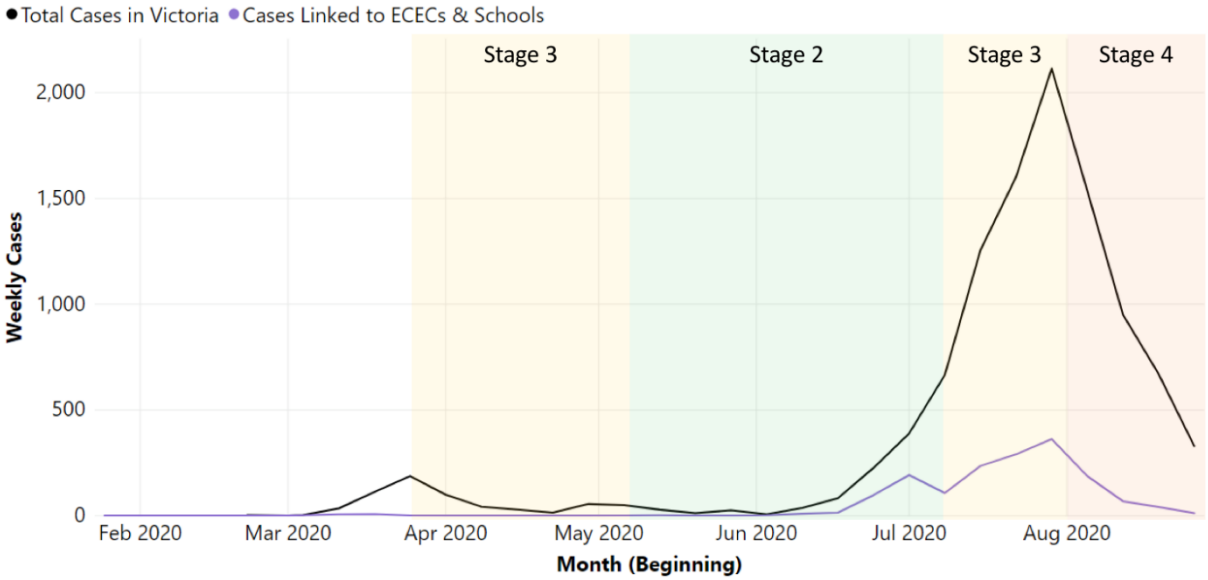


***Figure 18**. Epidemiological curve of confirmed SARS-CoV-2 cases in children and adults associated with schools and ECEC, in comparison to total cases in Victoria.*
(Labels on X axis mark the beginning of each month.)

Confirmed cases associated with events in ECEC and schools

Children accounted for 72 percent of contacts associated with events in ECEC and schools but only made up 48 percent of confirmed cases. This is consistent with emerging evidence about the relative vulnerability of children and adults to SARS-CoV-2 infection, as well as with the broader pattern of the epidemic in Victoria over this period. There were a slightly higher number of cases in women than in men, which may be influenced by the gender balance in teaching. The gender of contacts was not always recorded. The demographics of both cases and contacts associated with events in ECEC and schools are summarised in Table 4.

***Table 4**. Demographics of cases and contacts associated with events in Victorian ECEC and schools.*

	Cases, N (column %)	Contacts, N (column %)	All individuals, N
Total	*1,635*	*18,215*	*19,850*
Age group			
Children	779 (48)	13,119 (72)	13,898
Adults	856 (52)	5,097 (28)	5,953
Gender			
Female	897 (55)	5,668 (31)	6,565
Male	737 (45)	4,555 (25)	5,292
Not stated	1 (0.1)	7,992 (44)	7,993

There were 599 confirmed cases of SARS-CoV-2 infections in students and 254 infections among staff associated with ECEC and schools. Of the staff, 95 were teachers and teacher's aides, 84 were childcare professionals, 14 were in cleaners, and the remainder were in other school staff. Many SARS-CoV-2 infections associated with ECEC and schools would have been acquired in the community rather than at the ECEC or school itself. A considerable number (n = 753) of confirmed cases associated with ECEC and schools occurred in household members, rather than in staff or students (Figure 19).

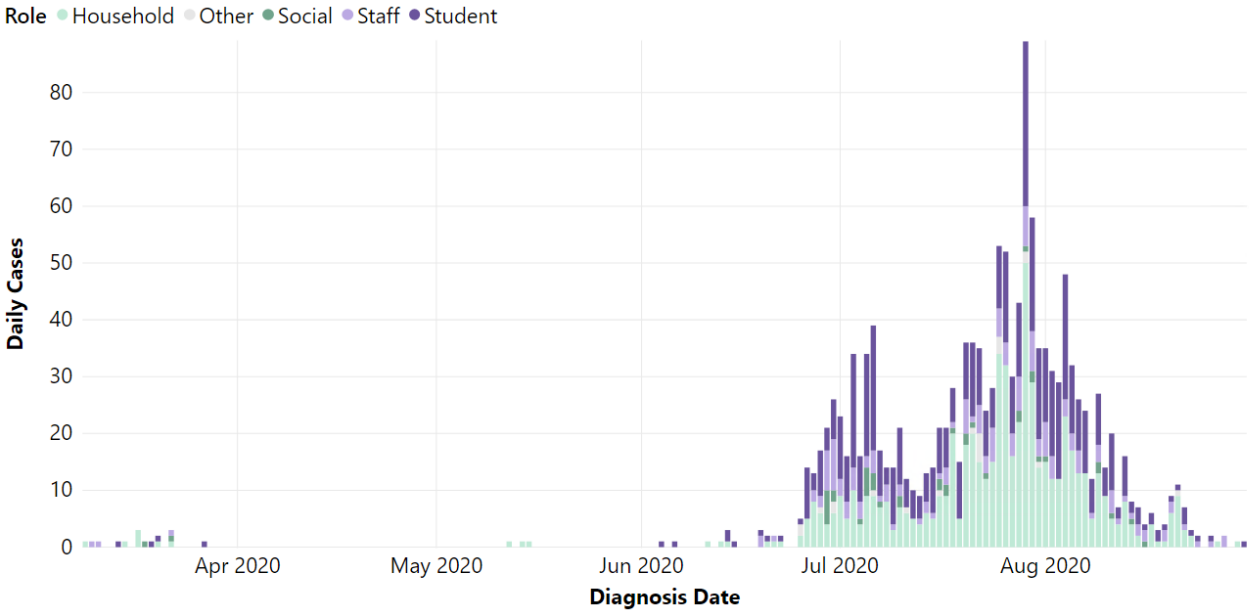


***Figure 19**. Epidemiological curve of confirmed cases associated with ECEC and schools by relationship to the event, March - August 2020.*

Events in secondary schools accounted for the greatest numbers of cases and contacts, and primary schools for the lowest numbers (Table 5). The low number of household contacts compared to household cases is because during the period of interest, 'contacts of contacts' were not routinely associated with outbreaks in PHESS, so for example the household members of school students would only be associated with the outbreak if either the student or the household member themselves were a confirmed case.

***Table 5**. Summary of SARS-CoV-2 cases and contacts associated with events in Victorian ECEC and schools by relationship to incident and school type.*

	Cases	Contacts	All individuals
Total	*1,635*	*18,215*	*19,850*
Relationship to event*			
Household	753	1,084	1,837
Other	17	1,252	1,269
Social	60	18	78
Staff	254	2,840	3,094
Student	599	13,034	13,633
School type*			
ECEC	381	4,012	4,393
Primary	303	2,778	3,081
Mixed	406	4,378	4,784
Secondary	554	6,857	7,411
Special	40	283	323

*Note that the same individual may be associated with multiple outbreaks in different ways, so subtotals may exceed grand totals

Geographic distribution of confirmed cases associated with ECEC and schools events

The geographic distribution of confirmed SARS-CoV-2 cases that were associated with events in ECECs and schools (Figure 20) was similar to the epidemic as a whole, with somewhat more geographic concentration than cases not associated with ECEC and schools. The greatest number of cases were seen in Wyndham local government area in western metropolitan Melbourne.

There was a total of 45 events and 23 outbreaks which involved 150 confirmed cases among people living in regional Victoria, including staff and students from regional Victoria employed at or attending schools in metropolitan Melbourne. The other 1,485 cases associated with schools and ECEC all resided in metropolitan Melbourne. Residents of regional Victoria accounted for 9.2 percent of all confirmed cases associated with ECEC and schools.

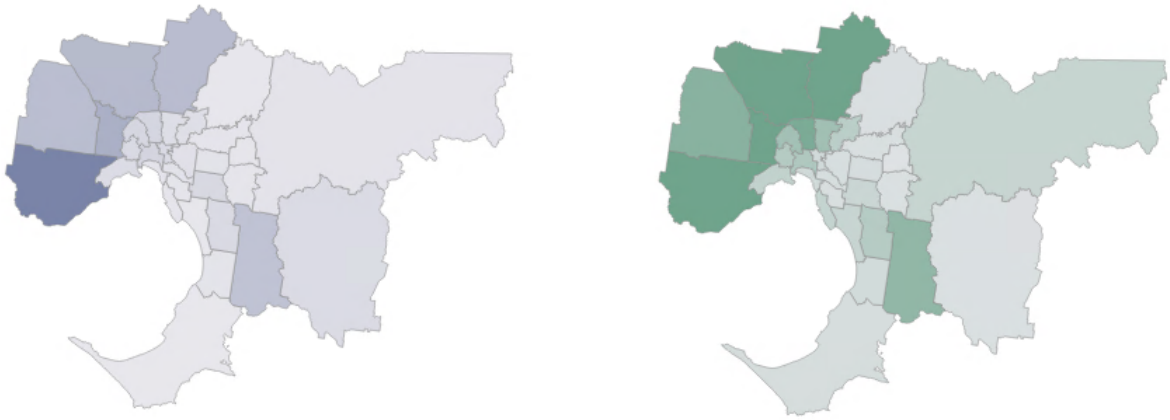


***Figure 20**. Geographic distribution of SARS-CoV-2 infections associated with events in ECEC and schools (left), and not associated with ECEC and schools (right).*

Clinical outcomes of cases 'downstream' from outbreaks at ECEC and schools

There were 139 downstream confirmed cases among staff and 373 downstream cases among students associated with ECEC and schools. Downstream cases are those diagnosed after the first identified case is diagnosed - some of these people may have acquired SARS-CoV-2 from the same source as the first identified case, and some may have been second or third generation cases associated with an outbreak that started at an ECEC or school. Among these individuals, 4 staff and 4 students were admitted to hospital at some stage during their illness (Figure 21), and all have recovered.

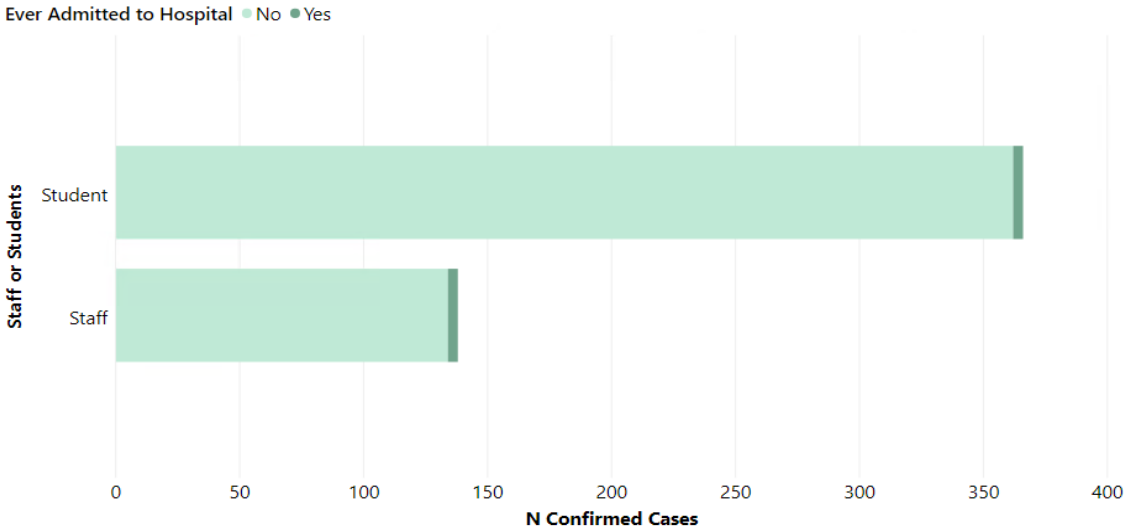


***Figure 21**. Hospital admissions among ECEC and school staff and students with confirmed SARS-CoV-2 downstream of events in ECEC and schools.*
*light green, never admitted to hospital; dark green, ever admitted to hospital.

Cases and contacts associated with events in ECEC and schools

The greatest numbers of cases and contacts were associated with events in ECEC and schools in July and August, when community transmission was highest (Figure 22). Many cases and contacts associated with these events were not physically present at the site, for example the household members of staff and students. Some people may be associated with an event after the site itself has closed, for example second generation cases and their contacts.

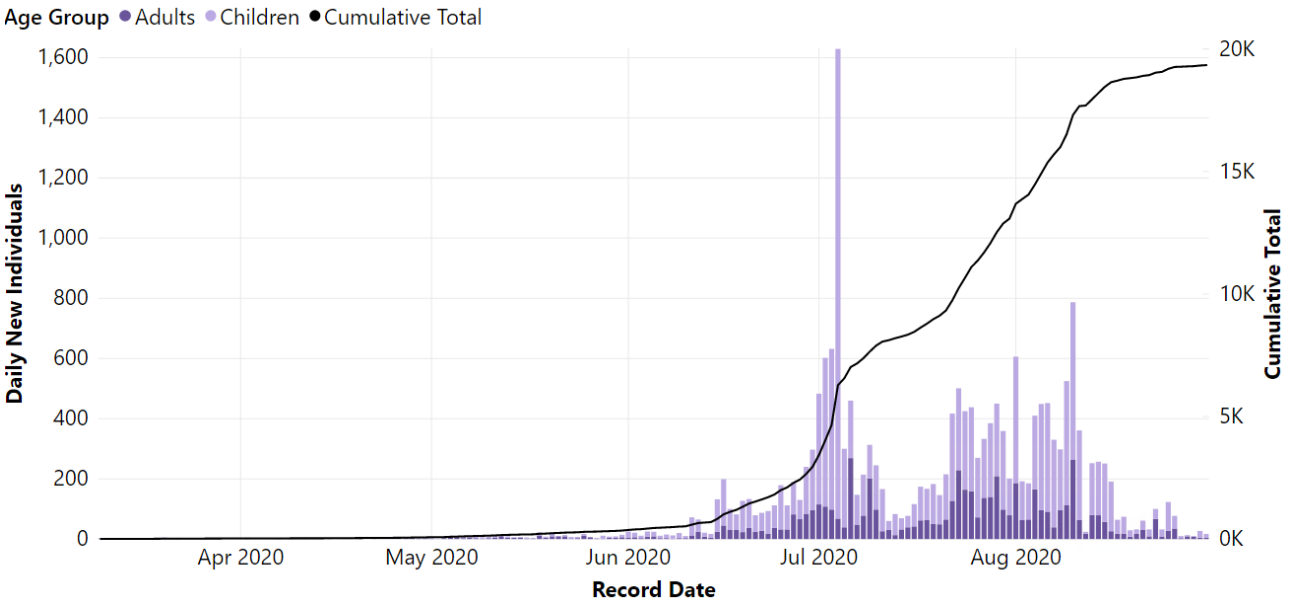


***Figure 22**. Daily number and cumulative total of all cases and contacts associated with events in Victorian ECEC and schools from March - August 2020, stratified by age group.*

The number of contacts associated with each event was also highly variable (Figure 23, excluding the two largest outbreaks). The median number of close contacts per event was 20 in ECEC, 16 in primary schools, 29 in mixed year level schools (e.g. Prep-12s), 53 in secondary schools and 22 in special schools. This pattern is not unexpected given the extensive mixing associated with the class timetables in secondary schools compared to primary schools, and highlights the challenges for contact tracing when students are mixing in different classes. Forty eight of the 343 events (14 percent) involved more than 100 close contacts.

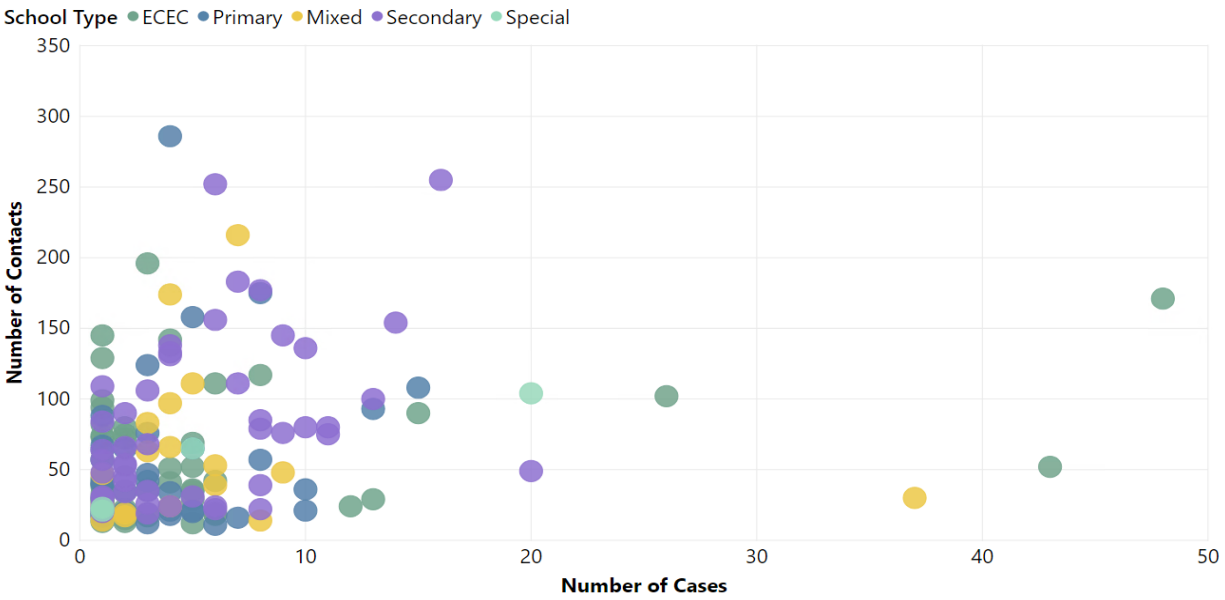


***Figure 23**. Relationship between the number of confirmed SARS-CoV-2 cases and numbers of contacts per event, excluding 2 very large outbreaks (outliers).*

Events in ECEC services

There were 113 events in which a person with confirmed SARS-CoV-2 infection attended an ECEC while potentially infectious. Of these, 85 (75 percent) were 'complex cases', involving a single case in a staff member or a student, and 28 (25 percent) were outbreaks. Of the 28 outbreaks at ECEC, half (n=14) involved 5 or less cases, 25 percent (n=7) involved 6-10 cases, and 21 percent (n=6) involved more than 10 cases. No events in ECEC involved more than 50 cases.

A total of 381 confirmed SARS-CoV-2 cases were associated with ECEC, including staff, students, and household members. It should be noted that many cases associated with events in ECEC and schools would have been acquired in households or in the community, for example cases in the households of students or staff who may have taken SARS-CoV-2 into ECEC or schools, or who may have acquired their infection at school and then passed it on to second generation cases.

There were 109 confirmed cases in total among staff, 92 cases among students, and 181 cases among household members and people associated with the ECEC in other ways (Table 6). There was one confirmed case in a person with a different relationship to 2 outbreaks. Of the 234 'downstream' cases, 162 cases (69.2 percent) were in adults and 72 cases (30.7 percent) were in children.

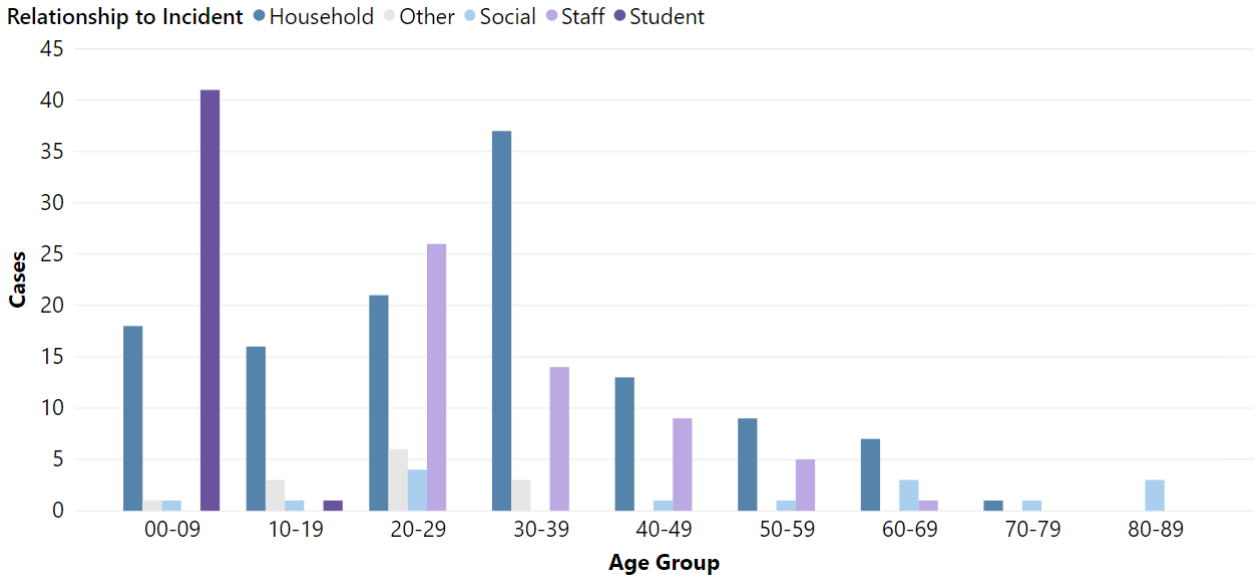
There were a total of 4,021 close contacts associated with all events in ECEC, including 794 staff, 2,487 students, 215 household members and 525 contacts linked in other ways (for example social contacts or visitors). The median number of confirmed cases in ECEC events was 2, and the median number of contacts was 22.

***Table 6**. Number of events (n=113) in Victorian ECEC, March - August 2020.*

	Total	Staff	Student	Household/other
Confirmed cases*	381	109	92	181
Number of close contacts*	4,021	794	2,487	733
Total (cases and contacts)	4,402	903	2,579	914

*Note that the same individual may be associated with multiple outbreaks in different ways, so subtotals may exceed grand totals

A majority of downstream confirmed cases associated with ECEC (that is, cases identified after the first identified case was diagnosed) were in young children and adults aged 20-49, with fewer cases among people over 50 and only 5 confirmed cases among people over 70 (Figure 24).



** Note that some individuals might be included in more than one outbreak.*

***Figure 24**. Confirmed SARS-CoV-2 cases downstream of ECEC according to age group and relationship to the ECEC.*

Relationship between the age of the first identified case and the occurrence of an outbreak

In ECEC events where the first case could be easily identified, the first case was a child aged 0-5 in 54 events and an adult in 52 events.

Outbreaks were much less common when the first case occurred in a young child aged 0-5 (Figure 25). Secondary cases were identified in 19 of the 54 events (37 percent) where the first case was an adult, and in 7 of the 54 events (13 percent) where the first case was in a child aged 0-5.

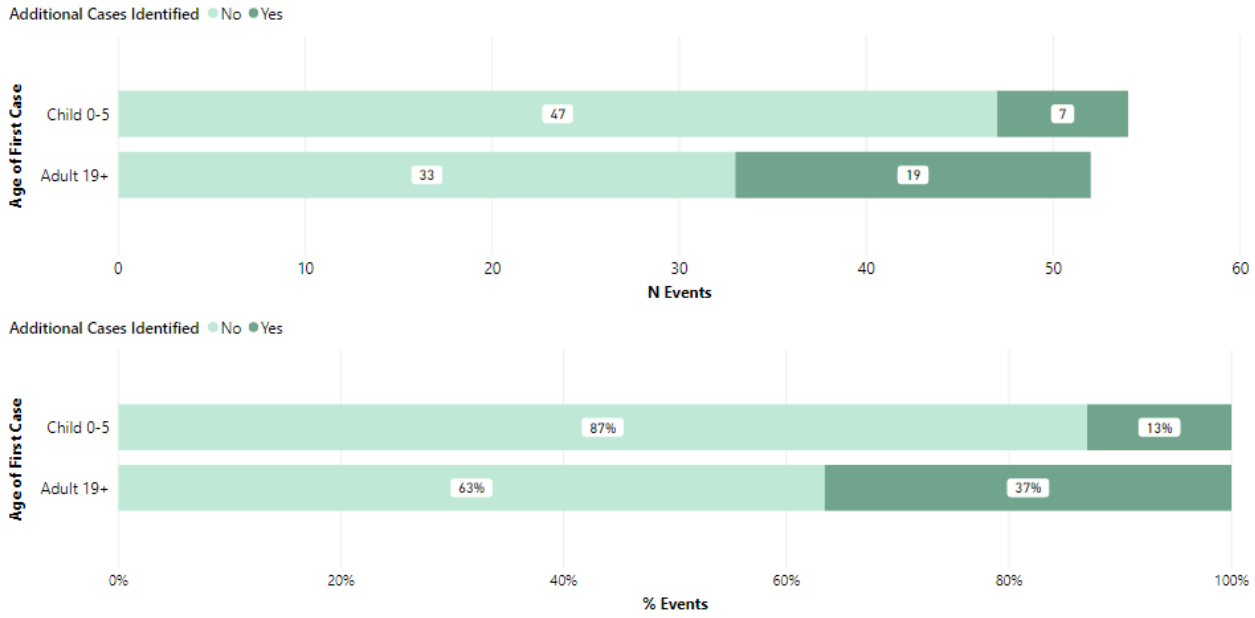


***Figure 25**. Number and percentage of events in ECEC that became outbreaks based on the age of the first identified case in a staff member or student.*

Events where the first case was identified in a child aged 0-5 involved a median of 26 contacts but a median of only 1 confirmed case (i.e. the first identified child, Figure 26). Events where the first case was identified in an adult followed the opposite pattern, with fewer contacts (a median of 21 contacts) but 2 confirmed cases (including the first identified adult).

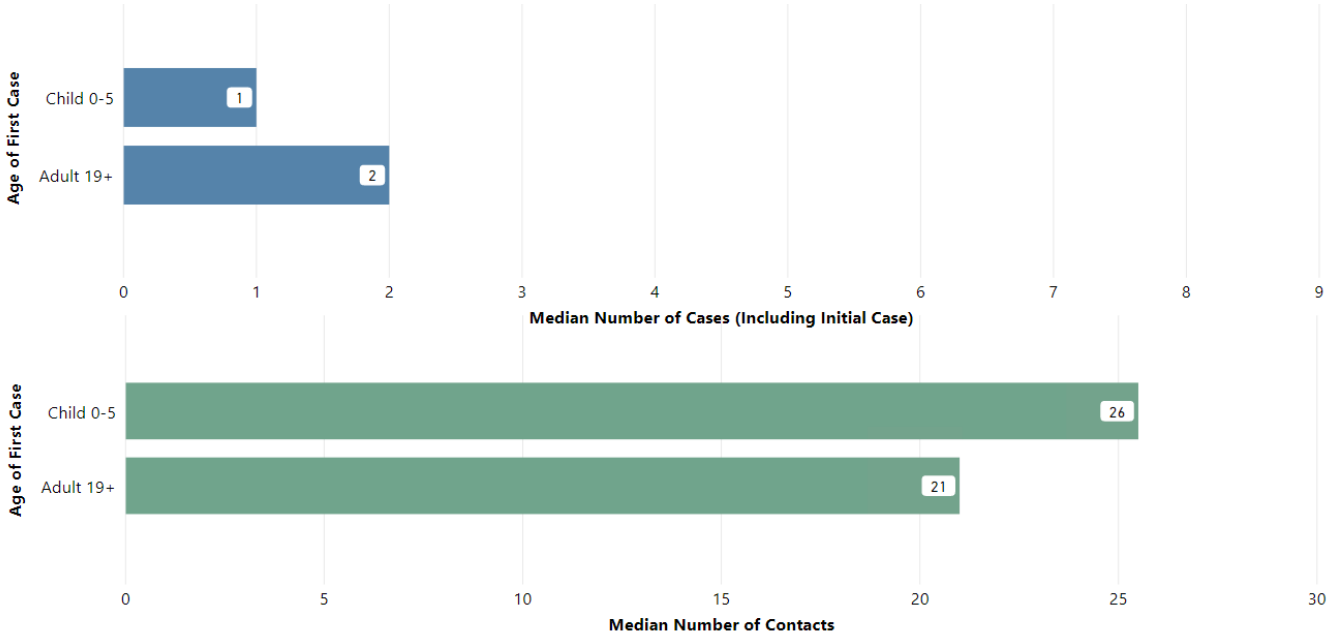


***Figure 26**. Median numbers of cases and contacts associated with events in ECEC according to the age of the first identified case in a staff member or student aged 0-5 years.*

Events in Schools

There were 230 events in which a person with SARS-CoV-2 infection had attended a school while potentially infectious. Of these, 144 events (63 percent) were 'complex cases' involving a single case in a staff member or a student, while 86 events (37 percent) were outbreaks (Table 7). In schools, 20 outbreaks (8.7 percent of all events in schools) involved more than 10 cases. There were 35 outbreaks (15 percent of all events in schools) involving 5 cases or fewer, 31 outbreaks involving between 6 and 10 cases (13 percent of all events in schools), 18 outbreaks (8 percent of all events in schools) involving between 11 and 49 cases and 2 outbreaks (0.9 percent of all events in schools) involving over 50 cases.

Secondary schools accounted for the greatest number of events, outbreaks, cases and contacts. There were 8 events in special schools, including 2 outbreaks (Table 7).

***Table 7**. Summary of all events in schools in Victoria, January - August 2020.*

School type	Events	Outbreaks	Cases	Contacts	All individuals*
Primary	87	26	303	2,778	3,081
Mixed level	40	19	406	4,378	4,784
Secondary	95	39	554	6,857	7,411
Special	8	2	40	283	323
All schools	*230*	*86*	*1,269*	*14,214*	*15,483*

* Note that some individuals might be included in more than one outbreak, and consequently subtotals may not equal grand totals

Profile of cases and contacts associated with events in schools

A total of 1,269 confirmed SARS-CoV-2 cases were associated with schools, including upstream and downstream cases in staff, students, and household members. The largest number of cases were associated with secondary schools, followed by mixed level schools, then primary schools and finally special schools. There were 146 cases in school staff, including 87 teachers and teachers' aides, 14 cleaners, and 45 people with other occupations associated with schools such as administrators and visiting workers.

***Table 8**. Cases associated with events in schools stratified by school type and relationship to school.*

School type	**Staff**	**Students**	**Others**	**All Cases***
Primary	48	108	147	303
Mixed level	57	172	177	406
Secondary	35	215	304	554
Special	7	13	20	40
All schools	*146*	*508*	*615*	*1,269*

* Note that some individuals might be included in more than one outbreak, and consequently subtotals may not equal grand totals

There were a total of 14,214 contacts associated with all events in schools, including 10,549 students and 2,046 staff. Events in secondary schools were associated with the greatest number of people in total, with a median of 53 contacts per event, compared to a median of 16 contacts per event in primary schools.

***Table 9**. Contacts associated with events in school stratified by school type and relationship to school.*

School type	Staff	Students	Others	All contacts*
Primary	485	1,871	422	2,778
Mixed level	610	3,345	423	4,378
Secondary	842	5,256	759	6,857
Special	109	77	97	283
All schools	*2,046*	*10,549*	*1,619*	*14,214*

* Note that some individuals might be included in more than one outbreak, and consequently subtotals may not equal grand totals

The majority of 'downstream' confirmed cases associated with schools were in children and adolescents (both students and household members), and adults aged 20-49 years, with only 4 cases among people over 70 (Figure 27). 'Downstream' cases includes anybody confirmed after the first case in a staff member or a student, including people who might have acquired their infection from the same source as the first case, as well as second or third generation cases associated with outbreaks that started in schools.

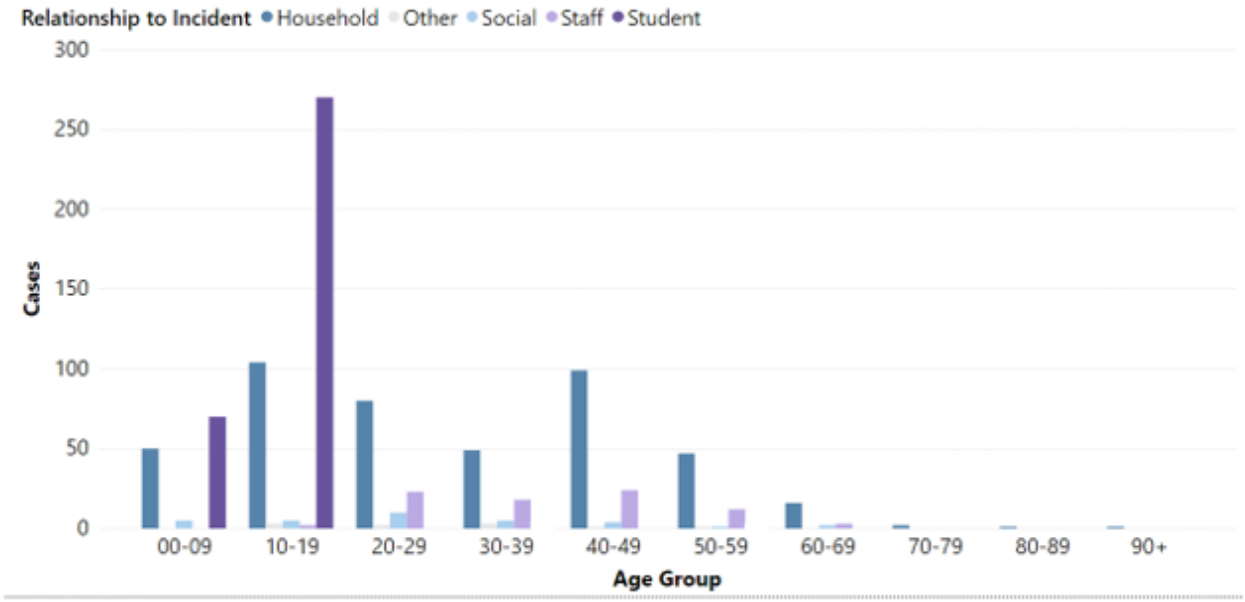


***Figure 27**. Confirmed SARS-CoV-2 cases downstream from schools according to age group and relationship to the school.*

Relationship between the age of the first identified case and the occurrence of an outbreak

In schools, the age of the first identified case was consistent with the setting (Figure 28). Children aged 6-12 accounted for the majority of first identified cases in primary schools and in special schools. Adolescents aged 16-18 were the most common first identified cases in secondary schools. Adolescents were also more likely to be the first identified case than younger children in mixed level schools. Adults were more common as first identified cases in primary schools and less common in mixed, secondary and special schools.

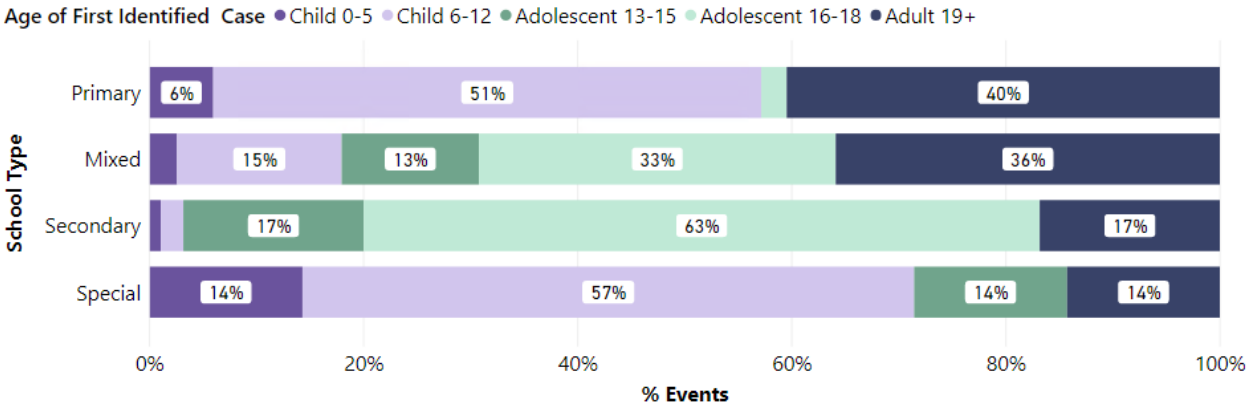


***Figure 28**. Percentage of first identified cases in each age group according to school type.*

In contrast to ECEC, there was a less pronounced relationship between the age of the first identified case in schools and the subsequent identification of additional cases. In schools, outbreaks were more likely to be identified when the first case occurred in an adolescent or in an adult (40 percent of events), compared to when the first case was identified in a child aged 6-12 (31 percent of events). The probability of an outbreak was very similar whether the first identified case was an adolescent aged 13-15 or aged 16-18, or an adult (Figure 29).

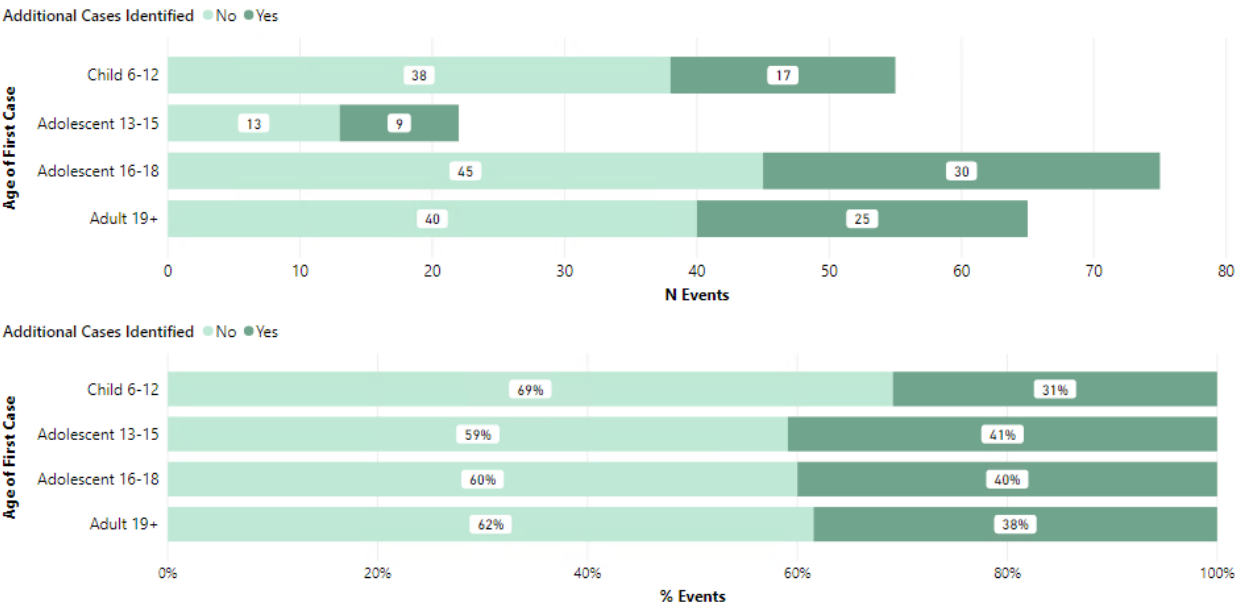


***Figure 29**. Number and percentage of events in schools that became outbreaks, according to the age of the first identified case.*

Together, first identified cases in adolescents aged 16-18 and adults were associated with the highest number of outbreaks. Detailed attendance data were not available for this analysis, which means the extent to which these patterns are due to the age of children attending school is uncertain, although there was a period of 4 weeks when years 11 and 12 students were attending schools in metropolitan Melbourne while students in years 7-10 were learning remotely.

School events in which the first case was in an adolescent involved higher median numbers of both confirmed subsequent cases and particularly contacts (Figure 30). Events where the first identified case was an adolescent aged 16-18 involved the highest median number of contacts by far – a median of 54 contacts per event.

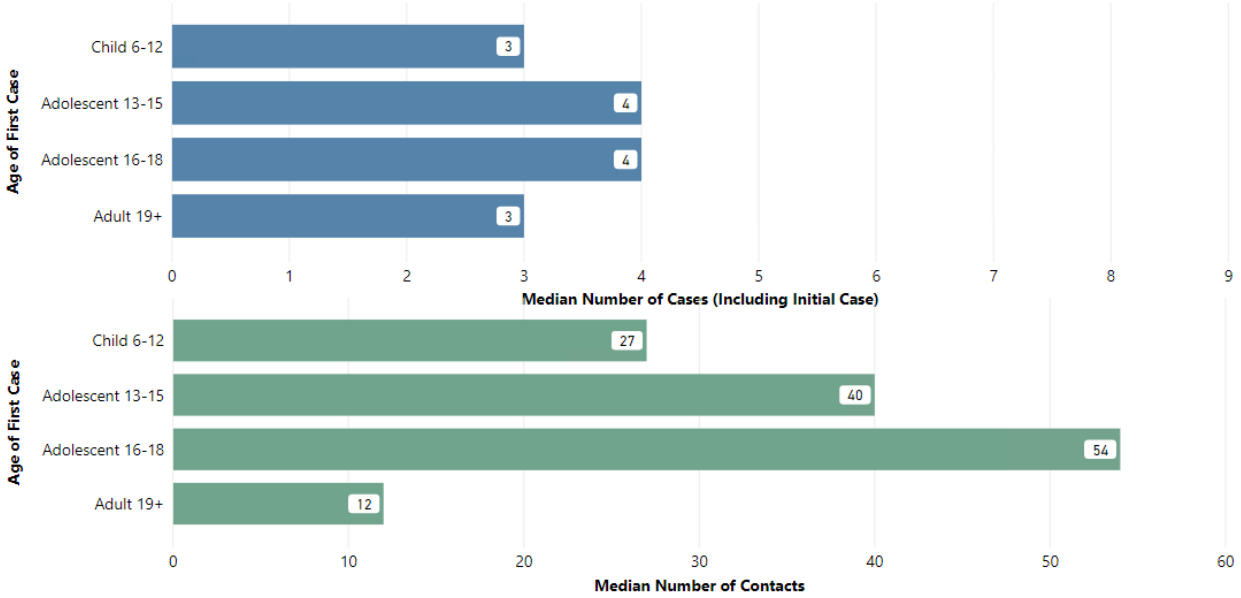


***Figure 30**. Numbers of cases and contacts associated with events in schools according to the age of the first identified case in a staff member or student.*

It is not possible to say from the data available exactly what transmission patterns occurred within outbreaks - given the variable incubation period for SARS-CoV-2, the sequence in which cases are confirmed cannot reliably indicate the direction of transmission.

Outbreaks with more than 10 cases

There were 26 ECEC and school outbreaks with more than 10 cases (large outbreaks) - 8 percent of all ECEC and school events. Six (5 percent) ECEC events, 4 (5 percent) primary school events, 3 (8 percent) combined primary/secondary school, 12 (13 percent) secondary school events, and 1 (12 percent) special school events were large outbreaks (Figure 31).

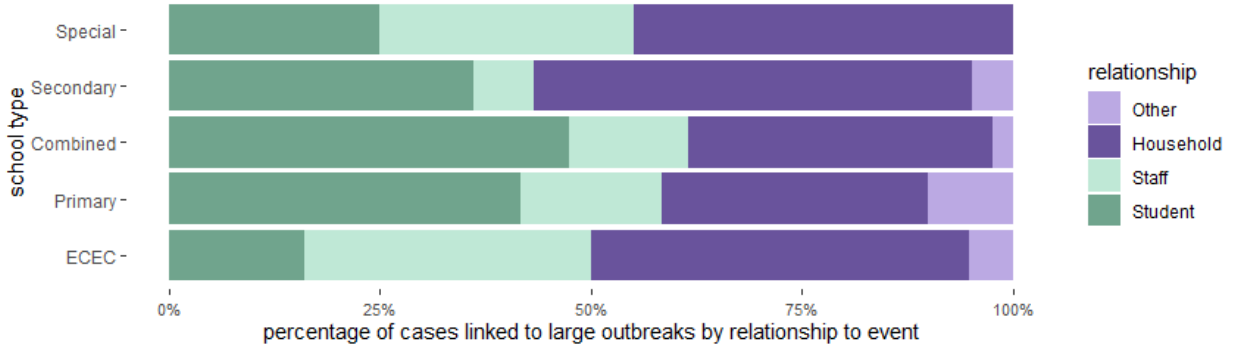


***Figure 31**. Total cases associated with large outbreaks, by relationship to outbreak.*

Of the 6 large outbreaks in ECEC, 4 occurred in July and 2 occurred in August (1 outbreak had the first case diagnosed late in August with contacts diagnosed in August and September). The number of cases in ECEC large outbreaks ranged from 12 to 48 cases. At least 40 percent of cases associated with ECEC large outbreaks were in household contacts who may not have directly attended the facility.

Of the 4 large outbreaks in primary schools, 2 occurred in June and 2 occurred in July. The number of cases in the 4 large outbreaks ranged from 12 to 20. Forty-one percent (41 percent) of cases in large primary school outbreaks were students and 17 percent of cases were staff.

Of the 12 large outbreaks in secondary schools, 3 occurred in June and 9 occurred in July. The number of cases in large outbreaks in secondary schools ranged from 11 to 53. Thirty-six percent (36 percent) of cases were students, and just 7 percent were staff; 5 of the 12 large outbreaks in secondary schools did not have any staff member cases associated with the outbreak.

Of the 3 large outbreaks in mixed primary/secondary schools, 2 occurred in June and one occurred in August. One school recorded 11 cases, one school recorded 37 cases, and one school recorded 208 cases.

The largest outbreak in a school or ECEC occurred in a mixed level primary/secondary school. This outbreak includes 208 confirmed cases and 2737 close contacts. This outbreak began in the final week of Term 2 when Victoria was in Stage 2 restrictions and gatherings of up to 10 were permitted. The school was closed 1 day after diagnosis of the first case in staff or students. The school remained closed for the duration of Term 3.

Impact of public health actions on SARS-CoV-2 transmission in ECEC and schools settings

Summary of public health actions undertaken at ECEC and school events

Contact tracing and timely isolation of close contacts is one component of the Victorian response, however the management of ECEC and school events has rapidly changed over the course of the pandemic to adapt to emerging evidence and the size of the response. As noted elsewhere, DET has provided schools and ECEC services with advice on transmission reduction strategies, adjustments to school operations and managing suspected and confirmed cases. DET has also provided advice to schools on the use of Personal Protective Equipment and supported government schools through the development of a COVIDSafe Plan for schools.

Throughout the pandemic, DET has worked closely with DHHS to improve processes around ECECs and school closures. Whilst the average time between confirmation of a first case and closure of the facility was 2 days, improved processes implemented by DET and DHHS resulted in this timeframe shortening over time. DET support and guidance on risk mitigation has also changed over the course of the pandemic in response to changing epidiomology and evidence: a summary of DET advice is in Table 11; note may not reflect current guidelines as DET guidelines evolving in line with emerging evidence.

Contact tracing

The standard definition of contact tracing is applied in ECEC and school outbreaks; all people in face-to-face contact for 15 minutes or in a larger space for 2 hours, cumulative, over the course of a day are deemed close contacts and required to isolate for 14 days. In ECEC and school event investigations, a list of contacts will be obtained from interview with the case and from facility management (principal, administrator). To expedite isolation, facility management may be requested to message all students and their family informing them of a case at the facility and advising to isolate while waiting for additional guidance from DHHS. The definition of a close contact may be broadened when a ECEC or school event becomes an outbreak and additional transmission is suspected to have occurred at the facility. The decision to broaden the definition is made on a case by case basis. From May 2020 close contacts associated with an event were recommended to test for SARS-CoV-2, regardless of symptoms, 11 days after their potential exposure to a case. In the following analysis we estimated the number of days between laboratory confirmation of the index case and contact with their close contacts by DHHS.

ECEC and school closures

All ECEC and schools that record an event are required to close while investigations and public health actions are undertaken. When case numbers rose significantly, DHHS recorded delays in receiving laboratory confirmation of new cases and interviewing cases. To maintain the timeliness of school closures, the DET worked with the DHHS to proactively close ECEC and schools. Proactive closure is when a decision to close the facility occurred following confirmation of a confirmed case of SARS-CoV-2 and prior to confirmation that the case attended the facility while infectious and were incorporated into the response to overcome delays in case interviews that would otherwise delay facility closures. Following the case interview, if the case was deemed to have not been on site while infectious it is not recorded as an event at DHHS and the facility could re-open. If a case was confirmed to have been on site while potentially infectious, additional public health actions would occur. Efforts were made to close the facility as soon as practicable. Some facilities elected to close early or remain closed longer than was required by DHHS/DET to manage challenges onsite associated with their event. School closure data are restricted to the dates required by DHHS/DET.

Outbreak squad

In May 2020 DHHS implemented the Outbreak Squad, a team of infection and prevention control experts who visit outbreak sites, assess measures in place to prevent transmission of SARS-CoV-2, and provide guidance to the facility to improve their measures and to the DHHS on the facility's readiness to reopen. The outbreak management team decides on a case by case basis whether an Outbreak Squad

visit is required.

Deep cleaning

Throughout the pandemic the DHHS has requested that ECEC and schools with an event conduct a deep clean prior to re-opening to students. From late June, ECEC and schools were required to show evidence of the deep clean prior to reopening. The DET maintains a record of the date of deep clean across all government schools that have recorded an event. This data is not maintained for ECEC, independent or religious schools.

Public health actions undertaken at ECEC events

Of the 113 ECEC events, data on facility closures are available for 88 sites (78 percent). The date of confirmation of a case is the date that the laboratory completed the pathology request, there can be a slight delay in confirmation date with date notified to DHHS and DET, in particular when results are available late at night. On average, ECEC were closed within 2 days of the case being confirmed and, on average, facilities were closed 1 day prior to confirmation that a case attended while infectious inline with the DET practice of precautionary closures. As noted elsewhere, this timeframe narrowed over time due to improved processes. ECEC were closed for an average of 9 days; the average number of days that ECEC were closed increased from 5 days in June to 10 days in July (Figure 32).

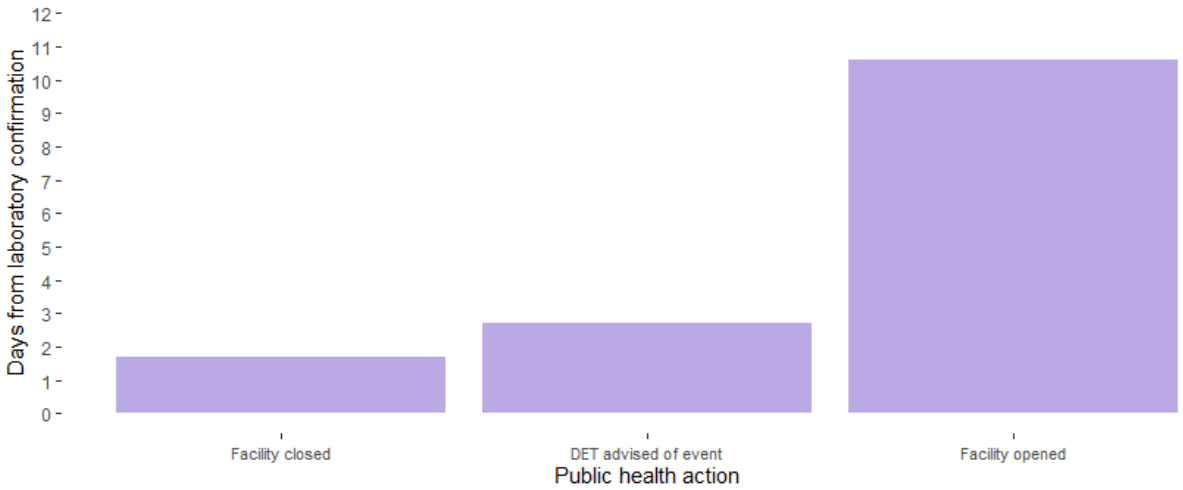


***Figure 32**. Average number of days between confirmation of the first case in staff or student and ECEC closing, date DET was notified that case attended while infectious, and facility re-opening.*

The number of contacts associated with ECEC events increased throughout June and declined in early July, in line with school holidays. The number of contacts associated with ECEC events declined sharply following the introduction of Stage 4 restrictions, with just 59 contacts being associated with ECEC events after August 6 (Figure 33).

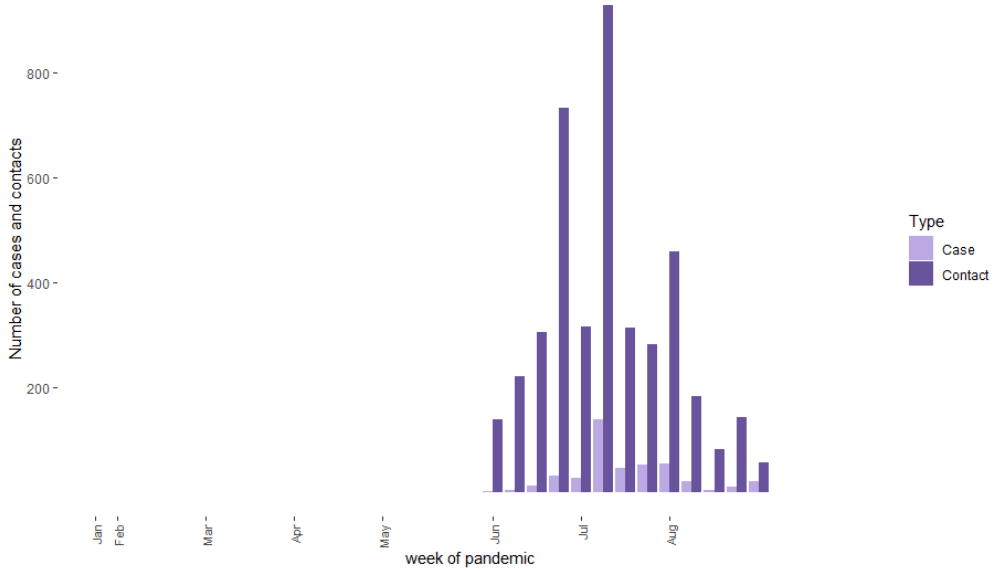


***Figure 33**. Number of cases and contacts associated with events in ECEC, by week, January- August 2020.*

Public health actions undertaken at school events

Of 230 school events, data on facility closures is available for 182 (79 percent) and data on cleaning is available for 122 government schools (53 percent). On average, schools were closed within 2 days of the first case being confirmed and, on average, were closed on the same day that DET was notified that a case attended the facility while infectious. As noted elsewhere, this timeframe narrowed over time due to improved processes. The deep clean occurred, on average, 6 days after confirmation of the first case. Schools were closed on average for 9 days; secondary schools were closed on average for 10 days and primary schools were closed on average for 8 days, this may reflect the larger number of cases and contacts associated with secondary schools (Figure 34).

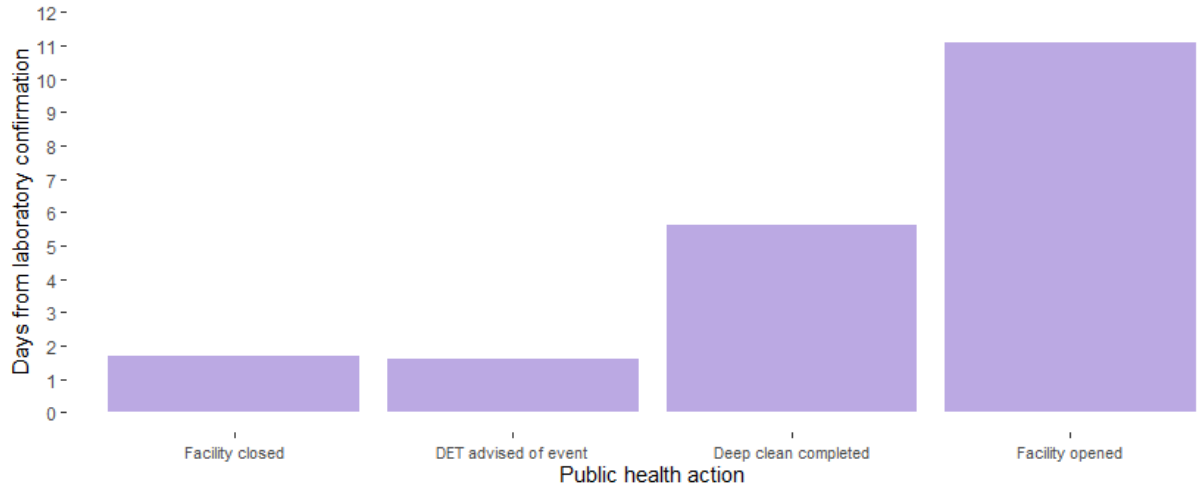


***Figure 34**. Days between confirmation of the first case in staff or student and school closing, DET was notified that case attended while infectious, recording a deep clean, and re-opening.*

There were 13 school outbreaks in which the duration between the first and last confirmation was over 28 days. It is not possible to establish whether cases were all linked by transmission in the school community, or whether there may have been multiple introduction events or waves of transmission

within households. On average, the first contact between DHHS and close contacts occurred within 5 days of the first case in staff or student being confirmed. Prior to contact by DHHS, ECEC and schools informed potential close contacts to remain at home and isolate.

The largest weekly number of contacts associated with primary school events occurred immediately prior to school holidays at the end of June/early July. School holidays dramatically reduced the number of primary school events and the number of linked contacts with just 3 contacts associated with an event in the first week of July (Figure 35). The number of contacts associated with secondary school events increased following the return to school and declined following the introduction of Stage 4 restrictions, following the pattern of infections in the broader community. Events in secondary schools recorded the largest number of contacts upon return to school in Term 3; over 2500 contacts were associated with secondary events in a single week. This pattern is different to that observed at primary schools and may be, in part, due to the staggered return of children to school in Term 3.

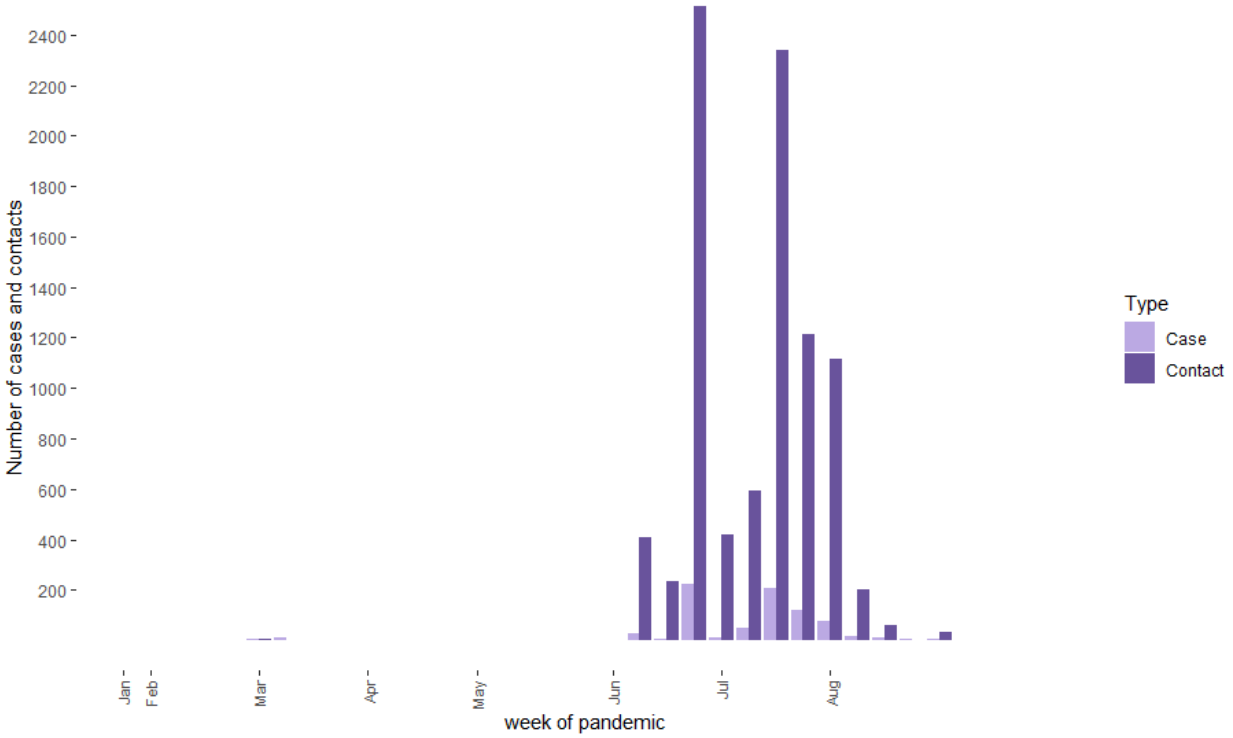


***Figure 35**. Number of cases and contacts associated with events in primary schools, by week, January - August 2020.*

Public health actions by size of event

Of the 343 events in ECEC and schools , 62 percent involved a single staff or student, 31 percent involved 2-5 staff or students and just 7 percent involved 6-10 or more than 10 staff and students (Table 10). There was a relationship between the number of staff and student cases associated with an event and the number of close contacts; events with a single case in staff or student had an average of 26 contacts, events with 6-10 cases had an average of 128 contacts, and events with 11+ cases had an average of 359 contacts. On average, events with 5 or less cases in staff and students recorded school closure within 2 days, while events with 6 or more cases recorded school closure within 3 days. The average number of days that an ECEC or school was closed increased with the number of cases in staff and students; events with a single case were closed on average for 7 days while schools with greater than 10 cases in staff and students were closed on average for 22 days. Within the public health response, a school or ECEC remained closed until all close contacts had been contacted, it is therefore not surprising that schools with a greater number of cases remained closed longer.

Table 10. Outbreak management by the number of staff and student cases associated with an outbreak.

	Total	1 case	2-5 cases	6-10 cases	11+ cases
Number of outbreaks	*343*	*212*	*107*	*12*	*12*
Settingtype					
ECEC	113 (32.9)	86 (40.6)	22 (20.6)	2 (16.7)	3 (25.0)
Primary	87 (25.4)	57 (26.9)	26 (24.3)	2 (16.7)	2 (16.7)
Combined	40 (11.7)	18 (8.5)	18 (16.8)	2 (16.7)	2 (16.7)
Secondary	95 (27.7)	45 (21.2)	40 (37.8)	6 (50.0)	4 (33.3)
Special	8 (2.3)	6 (2.8)	1 (0.9)	0 (0.0)	1 (8.3)
Avg. number of contacts	54	26	67	128	359
Days to close	2	2	2	3	3
Days closed	9	7	11	13	22

Public health actions undertaken at special school events

There were 8 events at special schools in Victoria. In total, 40 cases were associated with special school events; 13 students (32 percent), 7 staff (18 percent) and 20 household members (50 percent). On average, special schools closed in less than 1 day following diagnosis of the first case in staff or student and recorded a deep clean by day 5. On average, special schools were closed for 8 days.

Additional outbreak management support was provided to 2 special schools. DHHS worked with clinicians at the Royal Children's Hospital to provide SARS-CoV-2 testing on site at the school to reduce barriers to testing for this population. In both events, all staff and students at the school were classified as close contacts regardless of time spent with a confirmed case.

ECEC and school outbreak mitigation measures

We compared DET's school health and safety advice[129] of 10 August 2020 and the proposed considerations by DHHS as of 19 August 2020 (but not policy yet) to the Harvard "Healthy Schools Risk Reduction Strategies for Reopening Schools"[130] and the Viner et al.[131] considerations (Table 11), which for the purposes of this report are considered the "gold standard", to identify any additional potential mitigation measures that could be considered by DET. One of the key recommendations to add to the current DET mitigation strategies, is improved ventilation and air quality.[132] Note that between the analysis undertaken in this report and its publication, DET has issued updated advice for ECEC services and schools which includes measures related to ventilation, as recommended, in addition to other changes. An additional note is that the comparison made in Table 11 is specific to risk mitigation in schools, and not ECEC, however the recommendations largely apply across both settings.

***Table 11**. Comparison between DET school health and safety advice and Harvard and Viner et al. recommendations.* [133 134 135]

	Harvard guidelines[136] + Viner et al[137]	DET[138]
Healthy building	Increase outdoor ventilation Filter indoor air Supplement with portable air cleaners Verify ventilation and filtration performance Consider advanced air quality techniques Use plexiglass as a physical barrier Install no-contact infrastructure Keep surfaces clean	Promote fresh air flow indoors and maximise use of outdoor learning areas or environments with enhanced ventilation where possible and as practical depending on weather conditions Where soap and water are not readily available, hand sanitiser should be accessible in every occupied room Staff and students should be reminded to clean their phone regularly Continued extension of routine environmental cleaning, including progressive cleaning throughout the day to ensure that risks of transmission are reduced for high-touch services

[129] Victorian Department of Education and Training (DET). *Health and Safety Advice for on-Site Schooling in the Context of Coronavirus (Covid-19)*. Victoria: DET, 2020. https://is.vic.edu.au/wp-content/uploads/2020/03/Managing-risk-covid-19-school-boarding-premises_11082020docx.pdf.
[130] Jones, E, et al., *Healthy Schools: Risk Reduction Strategies for Reopening Schools*.
[131] Viner, Russell, et al., "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review."
[132] Morawska, Lidia, Julian W. Tang, William Bahnfleth, et al., "How Can Airborne Transmission of Covid-19 Indoors Be Minimised?", Environment international 142 (2020): 105832-32. https://dx.doi.org/10.1016/j.envint.2020.105832.
[133] Victorian Department of Education and Training (DET). *Health and Safety Advice for on-Site Schooling in the Context of Coronavirus (Covid-19)*. Victoria: DET, 2020. https://is.vic.edu.au/wp-content/uploads/2020/03/Managing-risk-covid-19-school-boarding-premises_11082020docx.pdf.
[134] Jones, E, et al., *Healthy Schools: Risk Reduction Strategies for Reopening Schools*.
[135] Viner, Russell, et al., "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review."
[136] Jones, E, et al., *Healthy Schools: Risk Reduction Strategies for Reopening Schools*.
[137] Viner, Russell, et al., "School Closure and Management Practices During Coronavirus Outbreaks Including Covid-19: A Rapid Systematic Review."
[138] Victorian Department of Education and Training (DET). *Health and Safety Advice for on-Site Schooling in the Context of Coronavirus (Covid-19)*.

	Harvard guidelines[136] + Viner et al[137]	DET[138]
Healthy classroom	Wear masks Wash hands frequently Maximise physical distancing to protect individuals Repurpose other large, unused spaces in the school as temporary classrooms (e.g., auditorium) Move class outdoors, if possible, and weather permitting Maximise group distancing to slow transmission chains Keep all books and equipment at school to avoid contamination Disinfect objects between users	It is not compulsory for staff to wear face coverings while teaching or caring for children, as they can interfere with their ability to clearly communicate with children. While teaching or caring for children, Staff can choose to wear face coverings if they wish. Where adequate physical distancing is limited, masks could potentially be considered Maintain physical distance from each other as much as possible Retaining smaller student groups to limit interactions: "class bubbles", and smaller "pods" within the "class bubbles" Density restrictions of one person per $4m^2$ in classrooms and corridors, and maintaining a physical distance of 1.5 metres between students during classroom activities will not always be practical in education settings. Physical distancing is most important between adults. Workstations should be spaced out as much as possible, and the number of staff in offices limited. Schools should consider the necessity of using shared items or equipment. e.g. shared computers, class sets of teaching and learning materials, musical instruments etc. Hand hygiene immediately before and after use of shared equipment is recommended. Risk can be further minimised by users of high-touch shared equipment wiping items down where appropriate, for example using a disinfectant/detergent wipe or cloth.
Healthy activities	Provide recess Modify physical education Reimagine music and theatre classes Continue sports with enhanced controls Add structure to free time	It is recommended that students do not drink directly from drinking fountains. Instead they should bring their own water bottle for use (and refilling) at school.

	Harvard guidelines[136] + Viner et al[137]	DET[138]
Healthy schedules	Manage transition times and locations Stagger school arrival and departure times, class transitions, and locker access Make lunchtime safer Rethink transportation Modify attendance Keep children in constant cohorts to reduce number of contacts	To decrease interaction with multiple people, it could be advisable to ask students to avoid public transport, and instead: • Walk or cycle to school. • Have parents drop them at school. • Where public transport must be used, a mask and hand hygiene may decrease the risk of school-related transmission. Staggered arrival and break times, where practical All staff, students and visitors to schools should undertake regular hand hygiene, particularly on arrival to school, before and after eating, after blowing their nose, coughing, sneezing or using the toilet. This should be directed or supervised by staff where required. Local school arrangements to reduce mixing between students and staff from different classes or year levels outside of the learning environment may continue to be of use as precautionary measures and include: • Staggering of break times and separating different classes or year levels when outdoors • Considering the order and pace in which classrooms are vacated • Organising student traffic in corridors and locker bays Sharing of food should not occur
Healthy policies	Establish and reinforce a culture of health, safety, and shared responsibility Form a COVID-19 response team and plan Prioritise staying home when sick Promote viral testing and antibody testing Establish plans for when there is a case Support remote learning options De-densify school buildings	All unwell staff and students must stay home Schools located in areas under 'Stay at Home' restrictions should conduct daily temperature checks of students on arrival Parents/carers of students with complex medical needs (including those with compromised immune systems), should seek advice from the student's medical practitioner to support decision-making about whether on-site education is suitable The following teachers and staff may be considered vulnerable and should take additional care to protect themselves and consider working from home may be at greater risk of more serious illness if they are infected with coronavirus (COVID-19) if they are: • aged 70 years and over • aged 65 years and over and of any age and have a compromised immune system • Aboriginal and Torres Strait Islander and are aged over 50 with chronic medical conditions. Schools should control visitor access on site and record contact details for all visitors Close proximity between adult members of the school community should be avoided, particularly during school drop-off and pick-up

	Harvard guidelines[136] + Viner et al[137]	DET[138]
	Hold staff meetings via videoconferencing as much as possible Protect high-risk students and staff Research and evaluation	Encourage non-contact greetings A face covering is mandatory travelling to school Standard precautions are advised when coming in to contact with someone for the purpose of providing routine care and/or assistance (for example, the use of gloves for nappy-changing, toileting, feeding) Standard precautions as per the Department of Education and Training Infectious Disease policy and related policies should be adopted when providing first aid Staff and students experiencing compatible symptoms with COVID-19, should be isolated in an appropriate space with suitable supervision and students should be collected by a parent/ carer as soon as possible. Urgent medical attention should be sought where indicated. It is not suitable for an unwell student to travel home unsupervised. The important actions to follow include hand hygiene, physical distance and putting on a surgical mask (both staff and student where appropriate). In the context of schools supporting students with complex health needs, if the care of an unwell child or young person is to be prolonged (for example, because it will take some hours for a parent to collect a child) and maintaining distance is not practical when providing supervision or direct care; surgical mask, gloves, gown and eye protection are recommended to be worn by the staff member. Face masks should not be used in situations where an individual is unable to safely or practically tolerate a mask (for example, a child with complex medical needs including existing respiratory needs. Children who are two years or younger must not wear face coverings as they are a choking and suffocation risk). If a staff member is unsure whether a student is unwell it is advisable in the first instance to contact the parent/carer to discuss any concerns about the health status of the student, and taking a precautionary approach, request the parent/carer to collect their child if concerns remain. Staff or students experiencing compatible symptoms with COVID-19 should be encouraged to seek the advice of their healthcare professional. Where staff or students have been tested, they must isolate until they receive their test result. Staff and students are generally not required to present a medical certificate stating they are fit to return to an education setting after a period of illness, however staff and students should not return until symptoms resolve. Contact the Department of Education and Training to report an IRIS incident alert if a student or staff member is a confirmed case. Where relevant, ensure the highest hygiene practices amongst food handlers where these services are operating, as per the Department of Education and Training Safe Food Handling policy.

Limitations

The quantitative analysis for this report was based on data as recorded in PHESS, which is the source of truth for COVID-19 reporting in Victoria. Additional data cleaning was undertaken over the course of several weeks specifically for this project, involving over 19,000 PHESS records.

Limited information is available about contacts in comparison to cases, and key details were missing from many records, for example demographic characteristics. A number of analyses could not be conducted due to incomplete data, for example an analysis of transmission dynamics within classes and year levels rather than at the level of the entire school.

The definition of 'upstream' and 'downstream' cases is based on diagnosis date and symptom onset date; however this does not necessarily indicate transmission. Two people from the same household may share a common exposure, and due to the variable incubation period of SARS-CoV-2, one may get sick over a week after the other. This does not necessarily indicate that one gave SARS-CoV-2 infection to the other, they simply had a later disease onset date. In addition, a member of a school community might acquire SARS-CoV-2 in an unrelated outbreak, but they might still be counted as a 'downstream' case of the school because the source of their infection cannot be identified with the data available in this analysis. The use of 'upstream' and 'downstream' in this report should be understood in that context.

We used DHHS definitions according to standard outbreaks reporting practice, which was developed by DHHS prior to this project. The datasets used in this analysis are part of an active ecosystem and are subject to daily revisions, as data are updated in PHESS and reporting practices change in response to public health needs. The research team did not have complete oversight over historical data recording, cleaning and reporting practices, which influence the dataset on which these analyses were conducted. Some variables were not usable due to variation in recording practices over time.

The final data cut was taken on the morning of Tuesday 15 September 2020 and the results in this report are final as of that date. Subsequent changes to data in PHESS will not be reflected in this report, for example data that related to events that occurred in August, some of which may still be under revision as public health actions are completed.

The DHHS analysis findings in this report are also subject to a number of other limitations:

- Guidance for contact tracing methodology changed during the pandemic and could have resulted in differences in data collected over time.
- Testing criteria only included symptomatic persons initially, which would have led to an underestimate of cases and transmission. Nevertheless, we found that there were very few serious cases of COVID-19 (which is likely to be complete in its reporting) associated with ECEC and schools and who required hospitalisation.
- As many cases are asymptomatic, particularly children, the "first identified" case may not have been the "true" first case in the outbreak. Therefore the "true" first case may have been missed (not tested) or have cleared the infection undetected.
- Many confirmed cases associated with outbreaks in ECEC and schools will have been the result of transmission outside the educational facility, including via other outbreaks.
- The impact of school transmission migiation strategies, could not be evaluated, apart from school closures, as it was not known how individual schools implemented these.

Summary of key findings

- There were very few cases in ECEC and schools when community transmission was low from March to May. Infections in children peaked at the time when community transmission was highest during July and then declined in August, suggesting that SARS-CoV-2 infections in children and in ECEC and schools are driven primarily by transmission in the broader community.
- There were a total of 1,635 SARS-CoV-2 infections associated with 343 events in ECEC and schools in Victoria between 25 January and 31 August, including staff, students, and household members. Over the same period, there were 19,109 confirmed cases recorded in Victoria as a whole. Cases associated with schools accounted for 8.5 percent of all cases in Victoria.
- There were 230 events in schools, but the risk of SARS-CoV-2 among students remained low, with 337 students being diagnosed with SARS-CoV-2 infection downstream of an event at a school. This represents an incidence risk of 33 cases per 100,000 students enrolled in schools this year. Only a small proportion of events in schools (8.7 percent) involved more than 10 confirmed cases.
- There were 113 events in ECEC, which were associated with 234 downstream cases. Of these, 162 cases (69.2 percent) were in adults and 72 cases (30.7 percent) were in children. Only a small proportion of events in ECEC (5.3 percent) involved more than 10 confirmed cases.
- Of 373 students and 139 staff diagnosed with SARS-CoV-2 'downstream' of events in ECEC and schools, there were 4 students and 4 staff were admitted to hospital with COVID-19, all of whom have subsequently recovered.
- Ninety-one percent of all cases and 84 percent of all contacts associated with events in ECEC and schools were identified in July and August, highlighting the substantial impact on ECEC and schools when community transmission is high.
- Thirty percent of events in primary schools went on to become outbreaks, compared to 41 percent of events in secondary schools.
- Events in secondary schools required more extensive contact tracing than events in primary schools, with a median of 53 contacts per event in secondary schools compared to 16 contacts per event in primary schools
- Events in which a young child (aged 0-5) with SARS-CoV-2 infection attended ECEC were very unlikely to result in an outbreak (13 percent of events), compared to events where an adolescent or adult attended a school (39 percent of incidents).
- Adolescents aged 16-18 and adults accounted for the greatest number of potential introductions into schools. However, this will have been influenced by the period during which VCE students were learning face to face while most other students were learning remotely.
- There was very limited transmission to adults aged over 70 associated with events at either ECEC or schools, with only 9 'downstream' confirmed cases in this age group. It is likely that there was little interaction between children and grandparents due to the broader community mitigation strategies in place to protect the elderly.
- It is not possible to determine the direction of transmission from child-child, staff-child, or child-staff and staff-staff as the extent and nature of contact between cases in the same events is not routinely captured in an easily analysable format, and some asymptomatic cases may go undetected. Further research is required to understand transmission dynamics within ECEC and schools.
- The average time between confirmation of the first case in an ECEC or school event and facility closure was 2 days and on average facilities were closed within 1 day of confirmation that that a case attended while infectious. On average ECEC and schools were closed for 9 days.
- Of all 1,635 SARS-CoV-2 infections associated with ECEC and schools, only 150 (9.2 percent) occurred in people living in regional Victoria. The geographic distribution of cases associated with schools was highly consistent with the broader epidemic.

Conclusions

The findings from this analysis are consistent with the international literature, namely:

- Prompt public health action, including facility closure and close contact tracing, isolation, and testing, prevents single cases of SARS-CoV-2 in ECEC and schools developing into outbreaks.
- Young children seem to transmit the virus less than adolescents and adults (teachers/staff), as cases that initially occurred in young children were uncommonly associated with outbreaks.
- Events in primary schools involved fewer close contacts than events in secondary schools, and were less likely to become outbreaks.
- Transmission into the ECEC and school setting is proportionate to broader community transmission.
- Although the analysis could not determine the direction of transmission in outbreaks, many cases associated with ECEC and school events occur within households and do not seem to spread within schools.
- Serious manifestations of COVID-19 are rare in children.
- Hospitalisations in teachers and other staff were rare.
- Further research is required to determine transmission in ECEC and schools & associated mental health impacts in order to inform policy.

Recommendations

Our recommendations are based on the findings from this analysis and a review of international literature:

- ECEC and schools should be prioritised for reopening and staying open to guarantee equitable learning environments and lessen social and educational effects of school closure.
- Closing education setting s should be a last resort, especially for ECEC and primary schools as children in these age groups are less likely to transmit and be associated with an outbreak.
- The single best policy to support ECEC and school reopening prior to the development of a vaccine or treatment is suppression of COVID-19 to near zero case incidence. This can be achieved via universal mask wearing, social distancing, reduction or elimination of indoor gatherings, staying home when sick, and rigorous and timely Testing, Tracing and Isolation within 48 hours of a notification.
- There should be a staged mitigation approach to opening up and staying open. Opening up ECEC and schools safely in order to protect the health, safety, and wellbeing of students, teachers, other ECEC and school staff should be based on the incidence of community transmission and as this varies by geographical location (e.g. regional and metropolitan Melbourne), different colour coded strategies are proposed which could be eased or progressed depending on the Road to Recovery Step level and the incidence of infection in each geographic area. Further details are provided below.
- Gathering data and evidence in term 4 are recommended to inform future education and health policy.

Approach to opening up ECEC services and schools safely

ECEC and schools across Victoria could be opened up safely and stay open to protect the health, safety, and wellbeing of students, teachers, and ECEC staff. Proposed mitigation strategies (Table 12) have been suggested that augment existing policy and which incorporates:

- The existing DET guidelines and the proposed DHHS considerations.[139]
- Guidelines adapted from the CDC[140] and the Harvard "Healthy Schools: Risk Reduction Strategies for Reopening Schools".[141]
- A review of the international literature on how other ECEC and schools have opened up safely. Data from many countries suggest that reopening schools during low transmission has not been associated with increases in community transmission, provided mitigation strategies are undertaken within ECEC and schools.
- Research on the role of children in transmission:
    - Pre-school and primary school aged children seem to transmit the virus less than adolescents, and therefore opening up ECEC and primary schools should be a priority, which is consistent with the findings from the DHHS data analysis in this report.
- The findings of the DHHS analysis in this report:
    - Transmission of SARS-CoV-2 within the school setting reflects community transmission; and this varies considerably between geographical location e.g. metropolitan Melbourne and regional Victoria. This is consistent with the international literature.
- As schools reopen, if appropriate physical distancing and hygiene measures are applied, schools are unlikely to be more effective propagating environments than other occupational or leisure settings with similar densities of people.
- Decisions on control measures in ECEC and schools and ECEC and school closures/openings should be consistent with decisions on other physical distancing and public health response measures within the broader community.

As such the guiding principles are framed on 4 progressive colour coded levels based on physical distancing, risks to vulnerable populations in ECEC and schools, hygiene, environmental cleaning, and timely notification and response to a case.[142] The progression from each colour: red, to orange, to yellow to green, is based on preventing ECEC and school transmission by increasing physical distancing between staff, students and parents, and de-densifying classrooms for Years 7-10, and for logistical reasons, coordinates with the level of COVID-19 restrictions in the broader community- the Victorian COVID-19 Roadmap to Reopening. Additionally, due to the differences in risk by geographical location, we propose that a more nuanced approach to mitigation measures be considered by geographic location e.g. regional Victoria and metropolitan Melbourne, and potentially by LGA (Table 13).

Gather data on SARS-CoV-2 transmission and student wellbeing in ECEC and schools to inform short to medium-term policy decisions

There are a number of gaps in our knowledge such as transmission in asymptomatic children, the direction of transmission and how best to inform ECEC and school closures based on balancing safety against the associated potential academic and wellbeing impacts for students. We also have few data on the psychosocial impacts of the infection on children, parents and teachers due to the necessary public health strategies over 2020 including the need to close ECEC and schools and move to remote learning. Further research is needed.

[139] Victorian Department of Education and Training (DET). *Health and Safety Advice for on-Site Schooling in the Context of Coronavirus (Covid-19)*. Victoria: DET, 2020. https://is.vic.edu.au/wp-content/uploads/2020/03/Managing-risk-covid-19-school-boarding-premises_11082020docx.pdf.
[140] Centers for Disease Control and Prevention. "Preparing K-12 School Administrators for a Safe Return to School in Fall 2020." U.S. Department of Health & Human Services. Last modified 26 Aug, 2020. Accessed 9 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/prepare-safe-return.html.
[141] Jones, E, et al., *Healthy Schools: Risk Reduction Strategies for Reopening Schools*.
[142] Australian Government Department of Health. "Australian Health Protection Principal Committee (Ahppc) Advice on Reducing the Potential Risk of Covid-19 Transmission in Schools." Commonwealth of Australia. Last modified 17 April, 2020. Accessed 14 Sept, 2020. https://www.health.gov.au/news/australian-health-protection-principal-committee-ahppc-advice-on-reducing-the-potential-risk-of-covid-19-transmission-in-schools.

Table 12. Colour-coded staged approach to opening up ECEC and schools safely.

Green
Reinforce everyday preventive actions **Healthy buildings** • Ensure proper ventilation within school facilities, including buses and toilets[143] • Use plexiglass as a physical barrier at school office, canteen etc., where possible. • Utilise no-contact infrastructure e.g. use door jams to avoid opening/closing doors as much as possible. • Physical distancing is most important between adults. Workstations should be spaced out as much as possible, and the number of staff in offices limited. • Continue extension of routine environmental cleaning, including progressive cleaning throughout the day to ensure that risks of transmission are reduced for high-touch services e.g. classroom computers, play equipment, hand-rails, door knobs, desks, bathrooms, toilets, and taps. **Healthy behaviours** • Where soap and water are not readily available, hand sanitiser should be accessible in every occupied room. • All staff, students and visitors to schools should undertake regular hand hygiene, particularly on arrival to school, before and after eating, after blowing their nose, coughing, sneezing or using the toilet. This should be directed or supervised by staff where required. • Staff and students should be reminded to clean their phone regularly. • It is recommended that students do not drink directly from drinking fountains. Instead they should bring their own water bottle for use (and refilling) at school. • A face covering is mandatory travelling to school for children >12 years old and all staff. **Healthy activities** • Maintain physical distance from each other as much as possible e.g. one way corridors • Maximise outdoor learning environments, as much as possible. **Healthy policies** • Close proximity between adult members of the school community e.g. parents should avoid contact with other parents and staff, particularly during school drop-off and pick-up. This may be unavoidable in ECEC. • When a confirmed case is identified at a school, the school should stop offline classes and proceed to online classes during the investigation. • Standard precautions are advised when coming into contact with someone for the purpose of providing routine care and/or assistance (for example, the use of gloves for nappy-changing, toileting, feeding). • Standard precautions should be adopted when providing first aid. • Staff and students experiencing compatible symptoms with COVID-19, should be isolated in an appropriate space with suitable supervision and students should be collected by a parent/carer as soon as possible. • All unwell staff and students must stay home. • Contact the DET to report an IRIS incident alert if a student or staff member is a confirmed case. • Where relevant, ensure the highest hygiene practices amongst food handlers, as per the DET Safe Food Handling policy. • Anyone who tests positive for COVID-19 should stay home and self-isolate for the timeframe recommended by public health officials.[144] • Parents/carers of students with complex medical needs, should seek advice from the student's medical practitioner to support decision-making about whether on-site education is suitable • The following teachers and staff may be considered vulnerable and should take additional care to protect themselves and consider working from home may be at greater risk of more serious illness if they are infected with coronavirus (COVID-19) if they are: aged 70 years and over; aged 65 years and over and of any age and have a compromised immune system; and Aboriginal and Torres Strait Islander and are aged over 50 with chronic medical conditions.

[143] Morawska, Lidia, Julian W. Tang, William Bahnfleth, Philomena M. Bluyssen, Atze Boerstra, Giorgio Buonanno, Junji Cao, Stephanie Dancer, Andres Floto, Francesco Franchimon, Charles Haworth, Jaap Hogeling, Christina Isaxon, Jose L. Jimenez, Jarek Kurnitski, Yuguo Li, Marcel Loomans, Guy Marks, Linsey C. Marr, Livio Mazzarella, Arsen Krikor Melikov, Shelly Miller, Donald K. Milton, William Nazaroff, Peter V. Nielsen, Catherine Noakes, Jordan Peccia, Xavier Querol, Chandra Sekhar, Olli Seppänen, Shin-Ichi Tanabe, Raymond Tellier, Kwok Wai Tham, Pawel Wargocki, Aneta Wierzbicka, and Maosheng Yao. "How Can Airborne Transmission of Covid-19 Indoors Be Minimised?", Environment international 142 (2020): 105832-32. https://dx.doi.org/10.1016/j.envint.2020.105832.

[144] CDC. "What to Do If You Are Sick." Last modified 11 Sept, 2020. Accessed 14 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html.

Yellow

In addition to all the actions listed above:

Healthy behaviours

- Use face masks in classes for primary school staff, and secondary school staff and students, except when outside.[145]
- Encourage non-contact greetings.
- To decrease interaction with multiple people, it could be advisable to ask students to avoid public transport, and instead:
    - Walk or cycle to school.
    - Have parents drop them at school.
    - Where public transport must be used, a mask and hand hygiene may decrease the risk of school-related transmission.

Healthy classrooms

- Students must remain within their relevant class or year group to limit mixing (years 1-8).
- Smaller student and teacher groups to limit interactions: "class bubbles", and smaller "pods" within the "class bubbles" should be considered, if feasible.
- Schools should consider the necessity of using shared items or equipment. e.g. shared computers, class sets of teaching and learning materials, musical instruments etc. Hand hygiene immediately before and after use of shared equipment is recommended. Risk can be further minimised by users of high-touch shared equipment wiping items down where appropriate, for example using a disinfectant/detergent wipe or cloth.

Healthy activities

- Stagger recess and lunchtimes, as much as possible.
- All physical activity and sports need to be outside with minimal use of shared equipment.
- No indoor gym use for sports or indoor school pool use.
- All group singing and or other chanting activities, as well as the use of wind instruments in group settings are not permitted, unless online.
- Dance activities and drama group work can continue under a COVID-19 Safety Plan.
- No school assemblies unless under a COVID-19 Safety Plan.
- School formals, dances, graduation or other social events are not permitted.
- No overnight school camps.
- Field trips and large gatherings and events are canceled, and communal spaces (e.g., cafeterias, media centres) are closed.

Healthy policies

- Hold staff and parent meetings via videoconferencing as much as possible.
- Support on-line learning for students or families who may need to isolate for other medical needs.
- Schools should control visitor access on site and record contact details for all visitors.
- Spectators, including parents and carers, are not permitted within school grounds or at sporting events held during school hours.
- Stagger arrival and departure times and entrance/exit areas, where practical.

Orange

In addition to all the actions listed above:

- De-densify classroom sizes by 50 percent for Years 7-10 e.g. alternating days (physical attendance/online learning) to limit class sizes
- Ensure that student and staff groupings/cohorts are as static as possible with limited mixing of student and staff groups

Red

In addition to all the actions listed above:

- ECEC and schools should work closely with DET and DHHS to make decisions on whether to maintain ECEC and school operations. The health, safety, and wellbeing of students, teachers, staff and their families is the most important consideration in determining whether school closure is a necessary step.
- Communities can support ECEC and schools staying open by implementing strategies that decrease a community's level of transmission. However, if community transmission levels cannot be decreased, ECEC and school closure is an important consideration. Plans for virtual learning should be in place in the event of a school closure.

[145] CDC. "Considerations for Wearing Masks." CDC. Last modified 7 Aug, 2020. Accessed 14 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html.

***Table 13**. Opening up ECEC and schools safely according to the Victorian coronavirus road to recovery, by colour code and geographical area.*

Road to recovery step	Metro Melbourne	Regional/LGA
Second	Yellow: all ECEC, primary, special schools & VCE	Yellow
	Orange: Years 7-10 only	
Third	Yellow	Green
Last	Green	Green
COVID-19 Normal	Green	Green

LGA: Local Government Area. ECEC: Early Childhood Education and Care. VCE: Victorian Certificate of Education.

Appendix

Appendix A: Search strategies for literature review

Embase search strategy

1. school/ or high school/ or kindergarten/ or middle school/ or nursery school/ or primary school/
2. School*.tw,kw,dq.
3. ((primary or secondary or elementary or privat* or state or mainstream) adj2 education*).tw,kw,dq.
4. (reception or preschool* or kinder* or prekinder* or nurser*).tw,kw,dq.
5. (sixth-form or form-six or post16 or post-16 or grade-12 or grade12 or year-12 or year12).tw,kw,dq.
6. teacher/ or teaching assistant/
7. (teacher* or teaching* or educator* or pupil or pupils or student* or headmaster* or headmistress* or principal*).tw,kw,dq.
8. (education* adj (setting* or workforce or worker* or staff* or practitioner* or personnel or employee*)).tw,kw,dq.
9. ((early-year* or early-childhood or early-learning or child-care or childcare or day-care or daycare or learning-disab* or special) adj2 (education* or centre* or center* or setting* or workforce or worker* or staff* or practice or practitioner* or personnel or employee*)).tw,kw,dq.
10. school health service/ or school health nursing/
11. (school* adj2 nurs*).tw,kw,dq.
12. or/1-11
13. exp coronavirinae/
14. exp Coronavirus infection/
15. SARS coronavirus/
16. severe-acute-respiratory-syndrome-coronavirus-2.hw.
17. coronavirus-disease-2019.hw.
18. ((corona* or corono*) adj1 (virus* or viral* or virinae*)).tw,kw,dq.
19. (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).tw,kw,dq.
20. (2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or COVID-19 or COVID19 or CORVID-19 or CORVID19 or WN-CoV or WNCoV or HCoV-19 or HCoV19 or 2019-novel* or Ncov or n-cov or SARS-CoV-2 or SARSCoV-2 or SARSCoV2 or SARS-CoV2 or SARSCov19 or SARS-Cov19 or SARSCov-19 or SARS-Cov-19 or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or SARS-2 or SARScoronavirus2 or SARS-coronavirus-2 or SARScoronavirus-2 or SARS-coronavirus2 or SARScoronovirus2 or SARS-coronovirus-2 or SARScoronovirus-2 or SARS-coronovirus2).tw,kw,dq.
21. (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).tw,kw,dq.
22. ((seafood-market* or food-market* or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).tw,kw,dq.
23. ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*)).tw,kw,dq.
24. (CoV2 or CoV-2 or COVID-2019 or COVID2019).tw,kw,dq.
25. or/13-24
26. 12 and 25
27. limit 12 to covid-19
28. 26 or 27
29. limit 28 to yr="2020 -Current

Medline search strategy

1. Schools/ or Schools, Nursery/
2. School*.tw,kf.
3. ((primary or secondary or elementary or privat* or state or mainstream) adj2 education*).tw,kf.
4. (reception or preschool* or kinder* or prekinder* or nurser*).tw,kf.
5. (sixth-form or form-six or post16 or post-16 or grade-12 or grade12 or year-12 or year12).tw,kf.
6. School Teachers/
7. (teacher* or teaching* or educator* or pupil or pupils or student* or headmaster* or headmistress* or principal*).tw,kf.
8. (education* adj (setting* or workforce or worker* or staff* or practitioner* or personnel or employee*)).tw,kf.
9. ((early-year* or early-childhood or early-learning or child-care or childcare or day-care or daycare or learning-disab* or special) adj2 (education* or centre* or center* or setting* or workforce or worker* or staff* or practice or practitioner* or personnel or employee*)).tw,kf.
10. School Nursing/ or School Health Services/
11. (school* adj2 nurs*).tw,kf.
12. or/1-11
13. exp Coronavirus/
14. exp Coronavirus Infections/
15. ((corona* or corono*) adj1 (virus* or viral* or virinae*)).tw,kf.
16. (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).tw,kf.
17. (2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or COVID-19 or COVID19 or CORVID-19 or CORVID19 or WN-CoV or WNCoV or HCoV-19 or HCoV19 or 2019-novel* or Ncov or n-cov or SARS-CoV-2 or SARSCoV-2 or SARSCoV2 or SARS-CoV2 or SARSCov19 or SARS-Cov19 or SARSCov-19 or SARS-Cov-19 or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or SARS-2 or SARScoronavirus2 or SARS-coronavirus-2 or SARScoronavirus-2 or SARS-coronavirus2 or SARScoronovirus2 or SARS-coronovirus-2 or SARScoronovirus-2 or SARS-coronovirus2).tw,kf.
18. (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).tw,kf.
19. ((seafood-market* or food-market* or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).tw,kf.
20. ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*)).tw,kf.
21. (CoV2 or CoV-2 or COVID-2019 or COVID2019).tw,kf.
22. or/13-21
23. 12 and 22
24. limit 12 to covid-19
25. 23 or 24
26. limit 25 to yr="2020 -Current"

Appendix B. Approaches to opening up ECEC and schools safely

(adapted from Public Health England[146], updated September 2020).

Country	ECEC and school reopening approach
Austria[147]	Most pupils returned to school on May 18 with staggered attendance, M-W/Th-Fr, students split into two groups, each attending lessons during half of the week. Pupils in their final year went back to school on May 4. From September, a four step "traffic light system" will be introduced: • **Green**: Normal classroom teaching, but the school should be aware of the risk of SARS-CoV-2 infection. • **Yellow**: Mouth-and-nose protection should be worn outside the classroom but can be taken off when seated. Singing should be done either outdoors or with a mouth-and-nose protection. Sport classes are recommended to be held outside. • **Orange**: No school activities anymore. Singing is only allowed outdoors. Teacher meetings must be online. High schools are recommended to provide distance learning. • **Red**: Distance learning in all schools if a general lockdown is announced. If needed, an emergency service is provided. General mitigation measures in place: • Teachers and students who are part of an at-risk group do not have to attend classroom teaching. If a person lives with an at-risk group member in the same household, it is necessary to provide a certificate from the doctor to excuse the absence. In case that the increase in COVID-19 number has a negative effect on someone's mental health, they can also be excused with a certificate. • FFP2-masks are provided for teachers belonging to the at-risk group. • Hygiene measures with regular washing and disinfecting of hands as well as sneezing and coughing into the elbow. • Additionally, a regular interval of approximately 20 min should be introduced for opening the windows.
Australia	Varies by state: Queensland:[148] Schools are required to maintain appropriate health and hygiene measures: • regular handwashing and hand sanitising, particularly before and after eating, and after going to the toilet • increased cleaning of school classrooms, particularly high frequency touch points including water fountains or bubblers • regular cleaning of playground equipment and play materials • physical distancing of adults. Western Australia:[149] As of 27 June: • All schools will have cleaning staff working throughout the day to ensure all high-use areas, such as benchtops, desks, doorknobs, taps and hand rails, are regularly cleaned and surfaces disinfected.

[146] Public Health England. *Transmission of Covid-19 in School Settings and Interventions to Reduce the Transmission: A Rapid Review*. England: PHE, 2020.
[147] Vindobona. "Austria Introduces Traffic Light System as Schools Are Reopening." Vindobona. 2020. Accessed 9 Sept, 2020. https://www.vindobona.org/article/austria-introduces-traffic-light-system-as-schools-are-reopening.
[148] Queensland Government. "Covid-19 Operating Guidelines for Queensland State Schools." Queensland Government. Last modified 28 Aug, 2020. Accessed 9 Sept, 2020. https://qed.qld.gov.au/about-us/news-and-media/novel-coronavirus/covid-19-operating-guidelines-for-queensland-state-schools#on-site.
[149] Western Australia Department of Education. "Current Schooling Arrangements." Department of Education. Last modified 22 June, 2020. Accessed 9 Sept, 2020. https://www.education.wa.edu.au/current-schooling-arrangements.

Country	ECEC and school reopening approach
	• Playgrounds are open and play equipment will be cleaned once per day. • Supplies of soap and other cleaning agents are available for all schools. • Students and staff will be encouraged to wash their hands as often as possible • Schools can choose to implement staggered starts, breaks and meal times to reduce contact • Events and activities such as assemblies, excursions, interschool activities, school choirs and examinations can now resume providing schools abide by the 2 square metre rule for visitors • School camps are permitted for up to 100 people, with schools required to follow the WA Department of Education's excursion policies and Australian Health Protection Principal Committee (AHPPC) advice. Additional guidelines have been developed to provide schools with further information relating to camps. • Sports training, games and interschool competitions can proceed with good hygiene practices. • In-term swimming classes can immediately recommence for students with physical distancing and good hygiene practices applied. • Students in secondary years are also able to get back to their work placements as long as schools make sure the employers are complying with WA COVID-19 Health Guidelines. • Canteens can now provide a dine-in service but must abide by the 2 square metre rule for food service Northern Territory:[150] As of 5 June 2020: • Practise and promote good hygiene including implementing routine hand washing by all children and staff members, before and after class and before and after meal breaks; • Consider moving classes outside, separating into smaller groups and/ or spreading into larger indoor spaces where possible; • Encourage the avoidance of handshaking, hugging and kissing, or games that include holding hands or other physical contact; and • All schools in the Northern Territory have received additional funding to enable them to increase their current cleaning regime. • Additional cleaning practices, physical distancing and hygiene practices are in place on school buses. • Where possible, minimising the number of adults entering school sites. Visitors are required to comply with all directions from the school regarding physical distancing and hygiene, and are encouraged to supply their own water bottle and hygiene products (hand sanitiser, tissues, etc.) wherever possible. New South Wales:[151] Schools are operating full time while actively following health advice: • All teachers, support staff and parents must maintain physical distance from each other (1.5m). Parents/carers and other non-essential visitors are not allowed on the school site. • All schools will be vigilant when implementing infection control, physical distancing and personal hygiene protocols to protect the health and safety of

[150] Northern Territory Department of Education. "Information for Parents and Carers About Ntg Schools for Term 3, 2020." Department of Education. Last modified 20 July, 2020. Accessed 9 Sept, 2020. https://education.nt.gov.au/publications/information-for-term-3-2020.
[151] NSW Government. "A Guide to Nsw School Students for Term 3." Last modified 9 Sept, 2020. Accessed 9 Sept, 2020. https://education.nsw.gov.au/covid-19/advice-for-families#Physical5.

Country	ECEC and school reopening approach
	students and staff. Schools will promote the need to follow good hygiene practices such as: regularly washing hands; avoiding sharing drinks or food; coughing or sneezing into your elbow, or a tissue which should be discarded immediately; filling water bottles from bubblers rather than using the bubbler directly. • Where possible, students will stay within their relevant cohort group (i.e. class, year group, or stage) for all learning activities within their school in order to limit close contacts to the relevant student cohort. • Interschool activities must remain within the local community or zone. • All group singing (choirs) and/or other chanting activities, as well as the use of wind instruments in group settings, are not permitted. • School assemblies (limited to 15 minutes and no external visitors) • Students can engage in sporting activities within restrictions Australian Capital Territory:[152] As of May 18: • It is safe for children to be in education and care services in the ACT, including out of school hours care. Tasmania:[153] The most important strategies for the Education and Care sector and schools to implement to assist families to stay healthy include: • Promoting personal hygiene and cough and sneeze etiquette • Additional cleaning (especially of frequently touched surfaces) • Encouraging physical distancing by cancelling or postponing a range of activities • Supporting staff and families to stay home if they are unwell • Supporting those who are more at risk of severe illness if they contract COVID-19 • Looking after the psychological wellbeing of students, staff and families. • Temporary site closures will likely occur when a confirmed case of COVID-19 is identified at a site. • All adults (including parents/carers) must still maintain physical distance from each other (1.5 metres) but this does not apply to children. • From term 3, reintroduced activities included: assemblies, excursions, sports carnivals, interschool competitions,face-to-face parent teacher meetings. Victoria:[154] Prep to Year 12 students are undergoing remote and flexible learning. The criteria for students that can attend on-site is as follows: • Refer to Table 11 for details • children whose parent/carer(s) are permitted workers who cannot work from home and where no other arrangements can be made • vulnerable children in out of home care, children known to child protection and other agencies and children the school identifies as vulnerable • children with a disability where the family is experiencing severe stress

[152] ACT Government. "Covid-19: Students, Education, and Childcare." ACT Government. Last modified 24 Aug, 2020. Accessed 9 Sept, 2020. https://www.covid19.act.gov.au/community/students-education-childcare.
[153] Tasmanian Government. "Covid-19: Schools and Childcare." 2020. Accessed 9 Sept, 2020. https://coronavirus.tas.gov.au/families-community/schools-and-childcare.
[154] Victorian Department of Education and Training (DET). "Term 3 Arrangements in Schools." Government of Victoria. Last modified 6 Sept, 2020. Accessed 9 Sept, 2020. https://www.education.vic.gov.au/about/department/Pages/term3.aspx.

Country	ECEC and school reopening approach
Canada[155]	Risk mitigation measures for schools operating during the COVID-19 pandemic: • Promote the use of personal practices (e.g. frequent hand hygiene, avoid touching face, respiratory etiquette). • Provide increased access to hand hygiene facilities (e.g. by placing hand sanitizer dispensers in easy to see locations). • Increase frequency of environmental cleaning, especially washrooms and high touch surfaces or equipment • Promote physical distancing as much as possible: replacing physical greetings with friendly verbal greetings or virtual high fives; where possible establish a 2m separation between children/youth, staff and volunteers; separation of children on buses by 2m where possible; increase desk distance between children • The use of non-medical cloth masks or face coverings should be considered for children over the age of 2 years • Restrict or manage flow of people in common areas including hallways, entrances/foyers • Postpone assemblies, team sports or extracurricular activities where physical distancing cannot be maintained or where touching of common equipment cannot be avoided • Limit or restrict non-essential visitors/guests
China[156]	All schools were reopened by early September 2020, with a range of mitigation measures in place: • Masks are required for students and teachers • Some have staggered arrival times for teachers and students • Students' temperatures are checked before they enter the school and during class • Social distancing is required: desks are spread out, smaller class sizes • Lessons are being held on a staggered schedule • In eastern China, schoolchildren are given hats to wear that measure three feet across, to remind them to keep a safe distance from others • At some schools in Shanghai and Beijing, students are assigned seats in the cafeteria and the tables are spaced at least three feet apart.
Denmark[157]	Daycare and primary school re-opening began on 15 April 2020, secondary school and youth education programs re-opened from 18 May 2020. Measures that have been taken to reduce transmission in schools: • There are no face masks for pupils or teachers. • Cohorting into small class groups (~12 people), avoiding crossover between groups, including staggered arrival and break times. • Children have their own desks, separated by two yards from another desk.

[155] Government of Canada. "Risk Mitigation Tool for Child and Youth Settings Operating During the Covid-19 Pandemic." Government of Canada. Last modified 20 July, 2020. Accessed 9 Sept, 2020. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/covid-19-risk-mitigation-tool-child-youth-settings-operating-during-pandemic.html.

[156] ABC News. "Coronavirus Update: China About to Reopen All Schools, Facemasks Become Compulsory in Paris." ABC News. 2020. Accessed 10 Sept, 2020. https://www.abc.net.au/news/2020-08-28/coronavirus-update-covid-19-paris-korea-india-pogba/12604172.
Cavanagh, Emily. "How 6 Countries Are Opening up Schools Again, with Temperature Checks, Outdoor Classes, and Spaced out Desks." Insider. Last modified 5 May, 2020. Accessed 10 Sept, 2020. https://www.insider.com/how-china-denmark-japan-reopening-schools-2020-4#students-undergo-temperature-checks-on-arrival-2.
CBS News. "What Back-to-School Looks Like for Students in China's Coronavirus Epicenter of Wuhan." CBS Interactive Inc. Last modified 6 May, 2020. Accessed 10 Sept, 2020. https://www.cbsnews.com/news/coronavirus-wuhan-schools-reopen-china-covid-epicenter-seniors-exams-today-2020-05-06/.
Katz, Leslie. "Kids in China Head Back to School Wearing Social-Distancing Hats." CNET. Last modified 29 April, 2020. Accessed 10 Sept, 2020. https://www.cnet.com/news/kids-in-china-head-back-to-school-wearing-social-distancing-hats/

[157] Cavanagh, Emily. "How 6 Countries Are Opening up Schools Again, with Temperature Checks, Outdoor Classes, and Spaced out Desks."
Coughlan, Sean. "How Reopened Schools in Denmark Keep Children Safely Apart." BBC News. Last modified 12 May, 2020. Accessed 10 Sept, 2020. https://www.bbc.com/news/education-52550470.
Vegas, Emiliana. "Reopening the World: Reopening Schools—Insights from Denmark and Finland." Brookings. Last modified 6 July, 2020. Accessed 10 Sept, 2020. https://www.brookings.edu/blog/education-plus-development/2020/07/06/reopening-the-world-reopening-schools-insights-from-denmark-and-finland/.

Country	ECEC and school reopening approach
	• Markings on the floor indicate how far apart students need to sit/stand. • Students must wash their hands every hour. • Surface cleaning has increased, with each door handle cleaned twice a day. • Outdoor teaching where possible, closure of the library. • At risk teachers and families can still teach and learn remotely. • Parents aren't allowed inside the school buildings and teachers are not allowed to congregate in classrooms.
European Union[158]	There have been various methods employed across countries, including: • Restricting class sizes • Opening schools only for specific age/year groups • Organising lessons with staggered timetables or alternating student cohorts between remote and in-school teaching • Maximising physical distancing
Finland[159]	Restrictions on education were gradually lifted from 14 May 2020. Mitigation measures in place: • Avoid unnecessary physical contacts • Arrange teaching premises more spaciously than usual • School break times and school meals must also be held with the students' own class or group • Large gatherings, such as spring festivals, have stopped. • Personnel must also work with the same group of children and hygiene guidelines must be strictly respected.
France[160]	Nursery and elementary schools opened 11 May, 2020. All students went back to school on 1 September, 2020. Mitigation measures in place: • Maintain physical distancing • Adults, middle and high school students must wear a mask • Maintain good hand hygiene • Cleaning and ventilation of the premises
Germany[161]	The following mitigation measures in Germany are recommended across the country, but each German state is responsible for education policy within its borders: • Schools have been instructed to develop comprehensive hygiene concepts. This includes making disinfectants available, cleaning sanitary facilities regularly and ensuring good ventilation in classrooms. • Some states want the use of simple face masks to become mandatory at schools. However, rules vary on who should wear the protective masks and when. Many states require the wearing of masks in corridors or rooms used during breaks, but not during lessons. • Wherever possible, students are organised in fixed learning groups to which

[158] European Centre for Disease Prevention and Control (ECDC). *Covid-19 in Children and the Role of School Settings in Covid-19 Transmission.*
[159] Foreigner. "Schools to Reopen 14 May under Strict Rules for Children and Teachers." Foreigner. Last modified 29 April, 2020. Accessed 10 Sept, 2020. https://www.foreigner.fi/articulo/work-and-study/schools-to-reopen-on-14-may/20200429213902005557.html.
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[160] French Ministry of Education. "Practical Arrangements for the Start of the 2020 School Year - Health Protocol." Ministry of Education. 2020. Accessed 10 Sept, 2020. https://www.education.gouv.fr/rentree-2020-modalites-pratiques-305467.
[161] Freund, Alexander. "Risks as Germany Reopens Schools in Coronavirus Pandemic." Deutsche Welle. Last modified 10 August, 2020. Accessed 10 Sept, 2020. https://www.dw.com/en/risks-as-germany-reopens-schools-in-coronavirus-pandemic/a-54507732.

Country	ECEC and school reopening approach
	particular teachers are assigned. These groups are meant to avoid mixing at schools.
Greece[162]	Schools are scheduled to reopen on 14 September, 2020. Mitigation measures recommended: ● Face masks will have to be worn by students and teachers ● Maintain physical distancing ● Wash hands often
Iceland[163]	Restrictions on school activities will take effect on 21 August, 2020 and are valid until 29 September, 2020. Mitigation measures in place: ● Kindergarteners can attend school ○ Staff are to maintain 1m distancing or wear facemasks ○ Parents maintain 1m distancing and not use any hygiene facilities at the school, only one parent can accompany a child. ○ There are no restrictions on gatherings of children of preschool age. ● Primary schoolers can attend school ○ Staff are to maintain 1m distancing or wear facemasks ○ Parents maintain 2m distancing. ○ There are no restrictions on gatherings of children of primary school age. ● Secondary schoolers can attend school ○ School work is permitted provided that students and staff can be at least 1m apart. In situations where this cannot be achieved, a face mask covering the mouth and nose should be worn by both teachers and students. ○ Plan so that each student associates with as few individuals as possible. Students shall be distributed on a permanent entrance to a school building as far as possible and the corridors shall be travel spaces. Permanent groups and classes should avoid mixing with other students as much as possible. ○ During physical education, contact is permitted between students during training and competitions. ○ Common contact surfaces in upper secondary school classrooms shall be disinfected between groups of students ● In all cases: measures shall be taken to clean or disinfect buildings after each day.
Italy[164]	Schools scheduled to open on 14 September, 2020. Mitigations in place for school opening: ● Seating pupils 1m apart ● Classes being divided into smaller learning groups ● Staggered arrival times for students

[162] Ekathimerini. "Greek Schools to Reopen Sept 7, Says Gov't Spokesman." Ekathimerini. 2020. Accessed 10 Sept, 2020. https://www.ekathimerini.com/255920/article/ekathimerini/news/greek-schools-to-reopen-sept-7-says-govt-spokesman
Panoutsopoulou, Magda. "Greece: Virus Fears Push Back School Opening 1 Week." Anadolu Agency. Last modified 1 Sept, 2020. Accessed 10 Sept, 2020.
[163] Stjornartidindi. "Notice on the Restriction of School Work Due to Epidemics." Stjornartidindi. Last modified 20 August, 2020. Accessed 10 Sept, 2020. https://www.stjornartidindi.is/Advert.aspx?RecordID=611e72ee-1ee1-4d4f-a09a-1e59feef3363.
[164] The Local. "Outdoor Lessons and Smaller Classes: How Italy's Schools Will Change When They Reopen in September." The Local. Last modified 30 June, 2020. Accessed 10 Sept, 2020. https://www.thelocal.it/20200630/outdoor-lessons-and-smaller-classes-how-italys-schools-will-change-when-they-reopen-in-september.
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Country	ECEC and school reopening approach
	• All students over six years old to wear are required to wear face masks when in public spaces; students will not need to wear masks at their desks so long as they maintain distance of 1 metre • Schools are also asked to open for lessons on Saturdays, though many Italian schools do this already • More outdoor learning • School buses and public transport carrying students must operate at a maximum of 80 per cent capacity
Japan[165]	Mitigation measures in place: • Students' temperature taken by parents before school, then checked by teachers on arrival • Teachers and students all wear masks • Sufficient ventilation • Children attend on alternate days so that half the desks in every classroom can be left empty • Regulations allow up to 40 children per classroom • Children are encouraged to keep their distance from their friends all the time • There are marks on the floor for physical distancing • Students wash hands throughout the day • Some schools have personal vinyl shields on each desk in a classroom, in addition to desks being spaced out. • Lunch is eaten at desks, facing forwards, in silence. • Going home early
Ireland[166]	Schools began reopening at the end of August, 2020. Mitigation measures in place: • Promote awareness of COVID-19 symptoms and advise staff and pupils that have symptoms not to attend school. • Physical distancing (2m) should be maintained where possible: reconfigure class spaces, utilise all available space in the school • Follow good respiratory hygiene - covering your mouth and nose with a tissue or your bent elbow when you cough or sneeze • Regular hand hygiene with a hand sanitiser • Class bubbles may reduce risk of infection: class grouping which stays apart from other classes as much as possible, and discrete "Pods" within those class bubbles. • Distance of 1m should be maintained between desks or between individual pupils • Staggered drop off/pick up times should be considered where practical and feasible • Arrangements for dropping off/collecting pupils should be arranged to encourage physical distancing of 2m where possible • Walking/cycling to school should be encouraged as much as possible • Avoid sharing items, minimise equipment sharing and clean shared equipment between uses by different people

[165] Craft, Lucy. "Schools in Japan Are Back in Session Amid Coronavirus Pandemic." CBS News. Last modified 5 Sept, 2020. Accessed 10 Sept, 2020. https://www.cbsnews.com/news/japan-schools-back-in-session-coronavirus-pandemic-covid-19/.
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[166] Government of Ireland. "Control Measures: Covid-19 Response Plan for Safe Reopening of Primary Schools." Government of Ireland. Last modified 17 Aug, 2020. Accessed 10 Sept, 2020. https://www.gov.ie/en/publication/dd364-control-measures-covid-19-response-plan-for-safe-re-opening-of-primary-schools/.
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Country	ECEC and school reopening approach
	• Face coverings to be worn by staff members where it is not possible to maintain a physical distance of 2m from other staff, parents, essential visitors or pupils • It is not recommended that children attending primary school wear face-coverings
The Netherlands[167]	Students of all ages can attend school, out-of-school care is also open. Mitigation measures in place: • Limiting the number of contacts by, for example, staggered breaks and start times; in some schools, plastic shields were installed around desks • Strict hygiene measures, disinfectant gel dispensers at the doorways • Increase ventilation • Physical distancing: ○ Children up to and including 12 years of age do not have to keep 1.5 metres apart from each other and from adults. ○ Young people aged 13 until 18 years old (i.e. 17 years old and younger) do not have to stay 1.5 metres apart from each other, but they do need to keep their distance from adults. ○ In secondary school and higher education, all students should stay 1.5 metres apart, regardless of their age. ○ All adults should stay 1.5 metres apart • Children aged 0 to 4 years old with cold symptoms are allowed to go to the childcare centre or host parent, as long as they do not have a fever. Similarly, children in group 1 or 2 of primary school with cold symptoms may go to school and to after-school childcare, as long as they do not have a fever.
New Zealand[168]	New Zealand has a 4-level Alert System that lists the measures to be taken against COVID-19 at each level. They have been at Alert Level 2 since 21 March, 2020. Currently, children are attending schools, early learning services and tertiary education. Mitigation measures for Alert Level 2: • Hand hygiene: Hand sanitiser at entry to classrooms and in shared spaces. Soap, water and the ability to dry hands must be provided in bathrooms. • Physical distancing: Children, young people and staff should be far enough away from each other so that they are not breathing on or touching each other, where practicable and reasonable 1m can be used as a guide, particularly between adults. Physical distancing of 2m is recommended for parents and caregivers. • Disinfect and clean all surfaces daily • Physical education classes and break time activities can include access to sports equipment including playgrounds but hygiene practice should be observed before and after playing with equipment. There will also need to be regular cleaning of shared equipment such as balls, sticks, etc. • Libraries can operate, books with plastic sleeves should be wiped down with a disinfectant wipe before re-issuing the next day • Interschool activities can take place with public health measures in place where possible and with other precautionary methods • Music: practices, rehearsals and performances can go ahead – physical distancing of 1 metre is recommended where practicable including singing and

[167] RIVM. "Children and Schools." RIVM. Last modified 3 Sept, 2020. Accessed 10 Sept, 2020. https://www.rivm.nl/en/novel-coronavirus-covid-19/children-and-covid-19.
[168] New Zealand Ministry of Education. *Health and Safety Guidance for Schools - Alert Levels 1-4*. New Zealand: Ministry of Education, 2020. https://www.education.govt.nz/covid-19/.

Country	ECEC and school reopening approach
	using wind instruments
Norway[169] [170]	Children were brought back to school from the end of April to the end of May, 2020, with kindergarteners returning first, then primary-school aged children, then high schoolers. Mitigation measures in place: • Physical distancing measures have been introduced, including dividing classes into groups of no more than 15 people • Hygiene is stressed, children wash their desks daily • Mask wearing was optional for both students and staff.
Singapore[171]	Most students returned to school in June with the following mitigation measures in place: • Daily temperature-taking and visual screening for all students and staff • Frequent cleaning of high-touch surfaces and disinfection of the premises to be done daily. • Students will practise frequent hand-washing throughout the school day and wipe down tables and shared equipment after use. • Reduced Intermingling through cohorting, students will be grouped based on their class and level and allocated designated rooms, preferably on different levels, to minimise contact. Meals will occur in designated rooms at staggered times. • Safe distancing ○ Fixed exam-style seating in classrooms with small group discussions allowed. ○ Students are to continue sitting in spaced seating arrangements in canteens, where possible. Otherwise, fixed groups of up to five from the same class will be allowed. ○ Staggered arrival, dismissal and recess timings to reduce congestion. • Students and staff are required to wear masks. In situations where wearing of masks may not be practical (e.g. students with health conditions), they may wear face shields instead.
South Korea[172]	Schools began re-opening in phases in May, 2020. Mitigation measures include: • Temperature checks on arrival • Desks are spaced out, and plastic partitions are on each desk • Marks of the floor indicating physical distancing • Smaller class sizes • Masks for all • Sit alone at meal times

[169] Medical Xpress. "Opening Schools Has Not Rekindled Epidemic in Norway: Official." Medical Xpress. Last modified 11 May, 2020. Accessed 10 Sept, 2020. https://medicalxpress.com/news/2020-05-schools-rekindled-epidemic-norway.html.
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[171] Singapore Ministry of Education. "Faqs for Covid-19 Infection in Singapore." Ministry of Education. Last modified 28 August, 2020. Accessed 10 Sept, 2020. https://www.moe.gov.sg/faqs-covid-19-infection.
[172] Godin, Melissa. "What the U.S. Can Learn from Other Countries About Reopening Schools in a Coronavirus Pandemic." Time. Last modified 20 July, 2020. Accessed 10 Sept, 2020. https://time.com/5868098/schools-reopening-coronavirus-denmark-south-korea-israel/.

Country	ECEC and school reopening approach
Spain[173]	Spain plans to have students return to school in September, although community transmission remains high. Mitigation measures in place for the return to school: • All students aged six and above must wear masks in class • Class sizes are to be reduced • Students are to be kept in assigned "bubbles" to prevent them mixing • Desks must be positioned at least 1.5m apart • All schools must improve open-air ventilation • Provide hand disinfection stations everywhere
Sweden[174]	Most preschools and schools have remained open over the course of the pandemic, high schools (16-19 years) were closed and distance learning was provided as it was considered that older age groups were more independent and could manage distance learning. As of 15 June 2020, Sweden recommended that all educational facilities remain open. Mitigation measures in place: • Physical distancing • Hand hygiene • Anyone with mild symptoms to stay home
Switzerland[175]	All schools are allowed to re-open in May, 2020, but individual cantons will make final decisions about re-opening. Some mitigation measures in place are: • Markings on floors to mark adequate space between students • Space between desks • Reduced class sizes by 50 percent, with attendance trimmed to just two days a week per group • Hand-sanitising stations • Physical distancing at school drop off and pick up
Taiwan[176]	Schools have remained open in Taiwan since the initial outbreak in Wuhan; schools opened on February 25, 2020 after extending winter break by 10 days. Mitigation measures in place include: • Students and teachers wearing face masks • Daily temperature testing • Disinfect their shoes and hands before entering the school's premises • Cohorting • Regular handwashing • Barriers (partitions) at lunchtime • Plastic desk top partitions Classes are suspended: • If 1+ in a class (student or teacher) at the K-9 level diagnosed with COVID-19, class is suspended for 14 days • If 2+ cases in a school, school is closed for 14 days • If one-third of schools in a township, city, or district are shut down, all others

[173] Shubert, Atika, and Laura Perez Maestro. "Spain Heads Back to School, but the Pandemic Is Exposing Inequality." CNN. Last modified 8 Sept, 2020. Accessed 10 Sept, 2020. https://edition.cnn.com/2020/09/08/europe/spain-school-inequality-intl/index.html.
[174] European Centre for Disease Prevention and Control (ECDC). *Covid-19 in Children and the Role of School Settings in Covid-19 Transmission.*
[175] Farge, Emma, and John Miller. "Swiss Back-to-School Angst Illustrates Worries around Easing Lockdowns." Reuters. Last modified 10 May, 2020. Accessed 10 Sept, 2020. https://www.reuters.com/article/us-health-coronavirus-swiss-education/swiss-back-to-school-angst-illustrates-worries-around-easing-lockdowns-idUSKBN22M0EH.
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Country	ECEC and school reopening approach
	are closed • If a student or teacher is diagnosed in a high school, college, or university, all classes they attend or teach is suspended for 14 days • If 2+ cases of COVID-19 in an institution at any level, it will close for 14 days
United Kingdom[177]	Plans for all schools in the United Kingdom to resume in full from September 2020. Essential mitigation measures include: • a requirement that people who are ill stay at home • robust hand and respiratory hygiene • enhanced cleaning arrangements • active engagement with NHS Test and Trace • formal consideration of how to reduce contacts and maximise distancing between those in school wherever possible and minimise potential for contamination so far as is reasonably practicable • Face coverings should be worn by staff and students, in schools and colleges, from year 7 and above, outside classrooms when moving around communal areas where social distancing cannot easily be maintained • Good ventilation How contacts are reduced will depend on the school's circumstances and will (as much as possible) include: • grouping children together • avoiding contact between groups • arranging classrooms with forward facing desks • staff maintaining distance from pupils and other staff as much as possible • Consider staggered start and finish times
United States[178]	Reopening of schools is decided by individual states and districts. Only five states have in-person teaching, most schools nationally remain closed. Re-opening of childcare is decided by individual states. Most states remain open with guidelines in place, some are open only for essential workers. Overall mitigation recommendations: • Physical distancing • Use of masks • Frequent hand hygiene • Use of cohorting • limiting or cancelling participation in activities where social distancing is not feasible • Maintain healthy environments (e.g., cleaning and disinfecting frequently touched surfaces) • Repurpose unused or underutilised school (or community) spaces to increase classroom space and facilitate social distancing, including outside spaces, where feasible • Proper ventilation
Vietnam[179]	Schools closed in late January and remained closed until May, 2020. All schools nationwide opened after implementing UNICEF-backed safety protocols:

[177] Government of the United Kingdom. "Guidance for Full Opening: Schools." Goverment of the United Kingdom. Last modified 7 Sept, 2020. Accessed 10 Sept, 2020. https://www.gov.uk/government/publications/actions-for-schools-during-the-coronavirus-outbreak/guidance-for-full-opening-schools.
[178] CDC. "Preparing K-12 School Administrators for a Safe Return to School in Fall 2020." CDC. Last modified 26 August, 2020. Accessed 10 Sept, 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/prepare-safe-return.html.
CNN. "Where Schools Are Reopening in the Us." CNN. Last modified 8 Sept, 2020. Accessed 10 Sept, 2020. https://edition.cnn.com/interactive/2020/health/coronavirus-schools-reopening/
[179] UNICEF. "Heading Back to School in the Pandemic." UNICEF. Last modified 24 July, 2020. Accessed 10 Sept, 2020. https://www.unicef.org/coronavirus/heading-back-school-in-pandemic.

Country	ECEC and school reopening approach
	• Wearing masks • Temperature checks • Hand-washing • Distancing in classrooms • Food hygiene measures • Most schools are following a shorter day
World Health Organization and UNICEF[180]	Where schools remain open, and to make sure that children and their families remain protected and informed, the guidance calls for: • Providing children with information about how to protect themselves; • Promoting best handwashing and hygiene practices and providing hygiene supplies; • Cleaning and disinfecting school buildings, especially water and sanitation facilities; and • Increasing airflow and ventilation.

[180] UNICEF. "Covid-19: IFRC, UNICEF and WHO Issue Guidance to Protect Children and Support Safe School Operations." UNICEF. Last modified 10 March, 2020. Accessed 10 Sept, 2020. https://www.unicef.org/press-releases/covid-19-ifrc-unicef-and-who-issue-guidance-protect-children-and-support-safe-school.

Appendix C: Terms of Reference

Early evidence suggested that COVID-19 transmission from children (aged 0-18 years) was relatively low. Recent evidence, however, has suggested that older children (>12 years) transmit the virus in similar rates to adults and that some factors may increase transmission from children.

In Victoria, Early Childhood Education and Care services (childcare services and kindergartens, ECEC) and schools have been supported to implement various COVID-19 mitigation strategies under Stage 2, 3 and 4 restrictions to reduce transmission among students and staff, including:

a. Restricting entry to students, staff and those delivering essential school/ECEC services and operations, and record keeping to closely monitor those on site.
b. Exclusion of unwell staff and students/children
c. Temperature screening on arrival at school/ECEC as a further control to assist students/children to recognise symptoms and stay at home if unwell
d. Regular hand hygiene practice and provision of hygiene supplies
e. Enhanced cleaning
f. Restricted visitors and reduced mixing between groups

In addition, comprehensive procedures are in place between DHHS, DET and ECEC and schools to respond to a suspected or confirmed case of COVID-19 and contain transmission.

Robust evidence in the Victorian context of the transmission risk at ECEC and schools is required to guide future policy decisions and any operational COVID-19 research required.

The Victorian Department of Health and Human Services (DHHS) conducts in-depth interviews on all notified cases (or their guardian) of COVID-19 to identify potential exposure risks, clinical history, close contacts, and onward transmission. DHHS and Department of Education and Training (DET) work collaboratively to manage outbreaks in ECEC and schools. Management of ECEC and school outbreaks includes forced closure, deep cleaning, and isolation of close contacts. In depth analysis of the transmission of COVID-19 in education settings and the impact of the range of public health actions has not yet been undertaken by DHHS staff.

MCRI will undertake an analysis of available DHHS data to explore key questions provided by DET and DHHS relating to transmission of COVID-19 in ECEC and schools and the impact of public health actions on curbing transmission.

Project aims

- Analyse transmission of COVID-19 in ECEC and schools outbreaks;
- Explore the impact of public health actions on COVID-19 transmission in ECEC and schools settings;
- Provide recommendations on transmission reduction strategies and any further data collection for COVID-19 surveillance and analysis required to guide future policy decisions.

Relevant information for informing policy

We will include a literature review of policy decisions in other jurisdictions and the impact of these decisions on COVID-19 transmission in schools. This will provide evidence of what has been successful in different settings and may provide guidance for additional policy measures in Victoria.

We will answer the project aims to provide evidence for policy decisions in Victoria. In particular we will explore transmission in separately in Victorian ECEC, primary schools, secondary schools and specialist schools to provide estimates of direction of transmission and risk factors for transmission within education settings. We will then explore the range of public health actions, in particular contact tracing and school closures, to estimate the impact of these actions on limiting transmission of COVID-19 in schools. Combined, these data will provide robust evidence using Victorian data of the factors that contribute to transmission of COVID-19 in schools and the factors that can stop transmission.

Data sources

We will use data available at DHHS for all analyses. Case and contact data will be cleaned to ensure completeness of data. Data will be extracted from the DHHS Public Health Enhanced Disease Surveillance System (PHESS). We will generate an outbreak management dataset with data extracted from PHESS, public health operations datasets, and Outbreak Management Reports.

Audience

The audience for this report are DHHS and DET staff.

Timeline

Activity	Due Date
Recruit 10x new RAs for data cleaning	24 August
Train and onboard new RAs	26 August
Data cleaning – public health actions	28 August
Data cleaning – all children	4 September
Data cleaning – outbreaks at school/ECEC	10 September
Data analysis plan	24 August
Data analysis code	10 September
Preliminary tables/figures populated	11 September
Report due	15 September

* Please note that due to the short timelines data cleaning will occur alongside generation of the analysis code and data included in the report will include the most up-to-date data.

Deliverables

We will produce a report to be submitted to DET and DHHS. The report will be produced by 15 September. We will prepare a manuscript for peer reviewed publication based on the findings produced in the report. The manuscript will be prepared after the report has been submitted, this does not have a due date but will be produced as soon as is reasonable to ensure timely publication of findings. Authorship will be agreed amongst the stakeholders.

Report plan

1. Executive summary
2. Background
    a. Rationale for the report
    b. What we know about the direct and indirect effects of COVID-19 in school-age children
    c. What we know (and don't know) about schools in Australia and internationally in terms of transmission
    d. What other countries are doing in terms of school mitigation measures
3. Aims and objectives
4. Methods
5. Results
6. Conclusions
    a. Against objectives
7. Recommendations based on findings from this analysis and review of international literature to
    a. provide approach to open up schools safely
    b. monitor transmission of COVID in schools to inform immediate policy decisions
    c. provide data to inform current and short-medium term response policy planning to ensure the best possible outcome for children and young people's health and development
8. Annex- Advisory Committee membership

Project team

Professor Fiona Russell-Team leader, MCRI and University of Melbourne

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Professor Sharon Goldfeld, MCRI

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Project Advisory Group

Staff from DET and DHHS

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