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Evidence Review: School Closures Impact on Learning, Child and Family Well-Being



Prepared by

Authors

- Dr. Naomi Dove, Physician Consultant, Office of the Provincial Health Officer of B.C.
- Dr. Jason Wong, Acting Medical Director, Clinical Prevention Services, BC Centre for Disease Control
- Dr. Réka Gustafson, Vice President, Public Health and Wellness, PHSA and Deputy Provincial Health Officer

Contributors (in alphabetical order): BC Children's Hospital clinicians, researchers, and leadership, Dr. John Carsley, Meghan Day, Dr. Quynh Doan, Dr. Eleni Galanis, Dr. Andrew Gray, Dr. Dee Hoyano, Dr. Perry Kendall, Gina McGowan, Dr. Geoff McKee, Daniel Naiman, Dr. Michael Otterstater, Dr. David Patrick, Stephen Smith, Dr. Kate Smolina, and Andrew Steele

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Endorsements

This document has been endorsed by:

- BC Children's Hospital,
- BC Centre for Disease Control, and
- BC Public Health Leadership committee, which includes public health and preventive medicine specialist physicians from all five regional health authorities, First Nations Health Authority, and the Office of the Provincial Health Officer.

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Executive summary

Closing schools is an exceptional measure to delay epidemic spread due to the significant effects of closing schools on families, workers, and the well-being of children and youth. As the pandemic surged globally, schools were closed in most countries based on evidence from influenza outbreaks and the assumption that limiting student contact helps flatten the outbreak curve, reduce the burden on the health care system and protect vulnerable populations. However, accumulating evidence, including local epidemiology and international data, suggests that younger children are at lower risk of infection and serious disease compared with adults, and do not tend to spread the infection widely, reducing the effect of school closures.

Schools support the learning, health, and development of children and youth and are key to reducing societal inequities. Prolonged school absences have detrimental effects on both children and families. Access to school resources for nutrition, health, and social supports are critical for many families. BC families reported impaired learning, increased child stress, and decreased connection during COVID-19 school closures, while global data show increased loneliness and declining mental health, including anxiety and depression. With the loss of supportive routines and structures, healthy behaviours have declined dramatically. Provincial child protection reports have also declined significantly despite reported increased domestic violence globally. This suggests decreased detection of child neglect and abuse without reporting from schools.

The impact of school closures is likely to be experienced disproportionately by families subject to social inequities, and those with children with health conditions or special learning needs. Interrupted access to school-based resources, connections, and support compounds the broader societal impact of the pandemic. In particular, there are likely to be greater effects on single parent families, families in poverty, working mothers, and those with unstable employment and housing.

COVID-19 is likely to be a fact of life for the foreseeable future. Evidence is accumulating that school closures are societally unsustainable in the long term, particularly given the lower risk of transmission from children to others, as well as the negative effects of prolonged school closures. For these reasons, numerous pediatricians and professional healthcare and public health organizations have called for schools to re-open fully this fall. This evidence review similarly finds that return to school, while posing some risk of COVID-19, offers greater societal and individual benefits than continuing to keep schools closed. Importantly, schools are not at higher risk of COVID-19 transmission than community settings. Since schools are part of the community, strong control of community transmission is important to successfully reopen schools with minimum transmission. Attention to prevention measures within schools can further reduce the risk of transmission in the school setting. Ongoing monitoring of COVID-19 cases and outbreaks in both schools and the community is essential for accurate risk assessment.

In British Columbia, public health and schools have a long history of working together to promote and protect the health of the school community. Public health and schools will need to continue to work together to promptly and appropriately respond to cases, clusters, and outbreaks of COVID-19 to ensure schools remain at low risk for COVID-19 transmission.

Preamble

On March 17, 2020, the Provincial Health Officer provided advice to the Ministry of Education that suspending in-class instruction was appropriate in the circumstances then existing. On March 27, 2020, the Provincial Health Officer advised school districts to provide in-class instruction for children of essential service workers. Over the following weeks, the advice evolved to include in-class instruction for vulnerable students and those requiring additional supports.

As COVID-19 is likely to be a fact of life for the foreseeable future, a need to understand the risks and benefits of keeping schools closed was identified. This document reviews relevant evidence, recommends return to school and suggests strategies for ensuring that risks to children and society are minimized, while benefits are captured.

This review is a synthesis of evidence as of August 18, 2020. As the scientific literature and BC data on the COVID-19 pandemic grows, our understanding of the consequences of school closures and pandemic measures on the health of children and families in BC will continue to evolve.

Purpose

The purpose of this rapid evidence review is to explore available evidence on the benefits and harms of K-12 school closures in the context of the COVID-19 pandemic. We will:

- i) assess currently available evidence on how children and youth are affected by COVID-19 and understand the role of children and youth in transmission.
- ii) explore the effectiveness of school closures on reducing community transmission of COVID-19 and
- iii) describe the consequences of school closures for the health and well-being of children and families.

The review will not weigh the relative merits of various approaches to infection prevention and control measures in school settings, nor will it provide guidance on risk mitigation strategies for school re-opening. For information and guidance on infection control precautions and risk mitigation strategies for school settings, please refer to the COVID-19 Public Health Guidance for K-12 School settings (http://www.bccdc.ca/Health-Info-Site/Documents/COVID_public_guidance/Guidance-k-12-schools.pdf) and the COVID-19: Guidance for School Re-opening (<https://www.sickkids.ca/PDFs/About-SickKids/81407-COVID19-Recommendations-for-School-Reopening-SickKids.pdf>).

Background

As of May 2020, school closures due to COVID-19 affected an estimated 70% of children and youth in 153 countries.¹ Schools suspended in-class instruction proactively based on evidence and assumptions from prior influenza outbreaks which suggested that limiting student contact helps to diminish and delay outbreak peaks, reduce health care system burden and protect high risk populations.² Closing schools is one of the non-pharmaceutical intervention (NPI) strategies to manage influenza outbreaks,³ based on data that children are more susceptible to influenza infection, tend to shed more of the virus,⁴ and have more difficulty adhering to hygiene practices and physical distancing than adults.

In practice, the effectiveness of school closures in influenza outbreaks is not clear and schools are not routinely closed to control influenza. In a systematic review of epidemiological studies, the incidence of influenza often decreased following school closures. However, there was heterogeneity among the studies and the contribution of school closures to decreases in influenza incidence was sometimes unclear as other interventions were applied concurrently.⁵ Mathematical modelling studies suggest that school closures can reduce and delay the peak of influenza epidemics, but the optimal duration of closure is uncertain.⁶ A systematic review of school re-openings during pandemic and seasonal influenza noted that the benefits of school closures on influenza incidence was sometimes reversed when schools opened. However, the specific benefits of school closures were difficult to tease out from broader community measures.⁷ Nevertheless, this evidence has informed recommendations to close schools in response to a severe influenza pandemic.⁸

As the COVID-19 pandemic has progressed, we have learned that SARS-CoV-2 behaves differently than influenza. We must understand these differences to balance the potential benefit of school closures against the known harm from long absences from school.

Burden of illness and transmission in children

Burden of illness

Data from around the globe suggest that children comprise a small proportion of diagnosed COVID-19 cases, have less severe illness, and mortality is rare. An estimated 0.33% of global COVID related deaths have occurred in children aged 19 or younger.⁹ Combined data from seven countries found the mortality rate from COVID-19 among children and youth 19 years old and younger is seven times lower than from lower respiratory tract infections.¹⁰ A systematic review of 45 studies found that children < 19 years account for 1-5% of diagnosed cases, often have milder disease, and rarely die due to COVID-19.¹¹ The largest case series to date of over 2000 pediatric patients found that 90% had asymptomatic, mild, or moderate presentations; with 0.6% experiencing critical illness.¹² A recent meta-analysis estimated that 16% of children with SARS-CoV-2 are asymptomatic, however other estimates are higher.¹³ Population data from the Netherlands determined that children 0-17 years represented 1.3% of all diagnosed cases of COVID-19, despite comprising 20.7% of the population.¹⁴ In national testing of mild cases initiated June 1, 2020, 0.3% of tests were positive in 16,500 children up to age 12 and 1.4% in 4,800 adolescents aged 13-18 years.¹⁵ In Canada, there have been 9,302 cases in children and youth 0-19 years, with 132 hospital admissions, 26 ICU admissions and 1 death as of Aug 5, 2020.¹⁶ In BC, 6.2% of all laboratory-confirmed cases of COVID-19 are among children and youth 0-19 years old, despite making up about 20% of the general population.^{17,18}

A number of hypotheses to explain why children are less susceptible to, and experience milder illness from, COVID-19 have been proposed. Suggested mechanisms include lower ACE 2 receptor concentrations, trained immunity from frequent viral infections or immunizations, and/or constitutionally elevated lymphocyte counts in children which confers a more active innate immune response.¹⁹ Additional factors may include healthier respiratory tracts due to less air pollution and cigarette smoke exposure, and fewer underlying disorders.²⁰

Multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19 is a very rare presentation and may be severe.^{21,22} It occurs more often in older children and commonly presents with gastrointestinal symptoms. Cardinal features can include persistent fever, inflammation and organ dysfunction, including shock and myocardial involvement. In the United States, 186 cases of MIS-C were reported between March 15 and May 20, 2020.²³ No cases of multisystem inflammatory syndrome associated with COVID-19 have been reported in British Columbia as of August 18, 2020. Retrospective reviews are underway to investigate if there may be some cases in British Columbia that were not reported.

Transmission

Children do not appear to be a major source of SARS-CoV-2 transmission in households or schools, a finding which has been consistent globally. Virus transmission from children to adults is uncommon, and within families transmission of the virus tends to be from adults to children.^{24,25} While transmission does occur in schools, global evidence suggest schools have not been a major source of outbreaks. Data compiled from four studies of school exposures suggests a 0.01% attack rate within schools.²⁶ A rapid review and quality appraisal of 33 studies of COVID-19 infections in school or day care settings determined a consistently lower prevalence of infection in younger children than among adults working in those settings, and for children who were infected, transmission was most often traced back to adults in community and home settings.²⁷ Furthermore, contact tracing studies of school outbreaks have identified limited transmission by children to other household members, other students or staff. This has been consistent both in settings which have remained opened and re-opened.²⁸

There is an age gradient among children's susceptibility and ability to transmit. While still lower than among adults, transmission from older children and youth was higher than younger children.²⁹ All children (i.e. 0-19 years) should not be treated similarly. Transmission potential in elementary schools is likely to be different than high schools, so different public health measures may be necessary in secondary schools. There may also be different numbers of contacts by age groups, particularly outside school, which must be factored in.

Transmission of SARS-CoV-2 in BC, was minimal during the early summer months. Reported infections have increased since mid-July. Most new infections are in defined clusters with few cases among children/youth 0-19 years.³⁰ Community transmission, considered as transmission outside of defined clusters, remains very low. Transmission models indicate that with increased community transmission, there is an increased risk of transmission to school populations as well. This is an expected finding, as schools are integral parts of the community. While children do not appear to play a significant role in community transmission of SARS-CoV-2, more remains to be learned about the clinical and epidemiologic characteristics of this virus in children. In particular, a high burden of asymptomatic infections and mild clinical presentations for children might mean that infection occurs undetected. As well, prolonged viral shedding detected by PCR in stool³¹ and nasopharyngeal samples³² can be expected

in children; further research will help determine whether this indicates live viral shedding in children. Monitoring and intervention plans for schools will need to take into account the differences between COVID-19 infections in children, youth and adults.

Effectiveness of School Closures for COVID-19

Evidence accumulating during the pandemic suggests there are important differences between how influenza and SARS-CoV-2 are transmitted. School closures may be less effective as a prevention measure for COVID-19. A systematic review of 16 studies found insufficient data to assess the efficacy of school closures during coronavirus outbreaks and questioned whether environmental, hygiene, and infection control precautions may as effective.³³ Results of modeling studies have been conflicting. While models from the first pandemic wave suggested that school closures in the context of a broader pandemic response (e.g. social isolation and physical distancing) reduced SARS-CoV-2 transmission and case counts, other models noted that school closures were not as effective as other NPI strategies nor sufficient as a stand-alone strategy.³⁴ An important limitation of earlier modeling studies is the assumption that, as with other respiratory viruses, children transmit more than adults; this assumption is not consistent with subsequent evidence.

Experiences of school reopening during the pandemic

So far, there is limited published data on school re-openings and COVID-19 transmission. It mainly consists of case reports of contact tracing and prevalence studies; however, experiences globally and within BC suggest that schools can be opened without substantial increases in COVID-19 transmission. School re-opening models have been implemented globally and nationally with varied distancing and infection control measures.

A review of 15 Australian schools and 10 early childhood education settings that remained open during the first pandemic wave - albeit with low attendance at epidemic peak - demonstrated low case numbers and secondary transmission rates, with rare child to child or child to staff transmission.³⁵ The re-opening of closed primary schools in Finland did not result in increased COVID-19 case counts, while Sweden did not experience elevated infection rates among children attending day cares, primary, and elementary schools that remained open throughout COVID Wave 1, with no increase in infection observed among school or day care staff.³⁶

The re-opening of preschool, primary, and secondary schools in Germany, Denmark, Finland and Norway did not result in outbreaks or significantly increased rates in younger children returning to school in countries with low community transmission, while the return of older students in a country with high community transmission appeared to increase rates among students but not staff.³⁷ A number of jurisdictions have reported increased cases as a result of school re-openings (e.g. Portugal, Israel, UK, US, New Zealand, and Quebec) however the data are difficult to interpret as most reports are anecdotal and in many cases testing and contact tracing were expanded concurrently, often coinciding with escalating community transmission.³⁸ No deaths have resulted.

A systematic narrative review of transmission risk related to the re-opening of school and day care settings in the context of COVID-19 is currently underway which will help moving forward in BC.³⁹

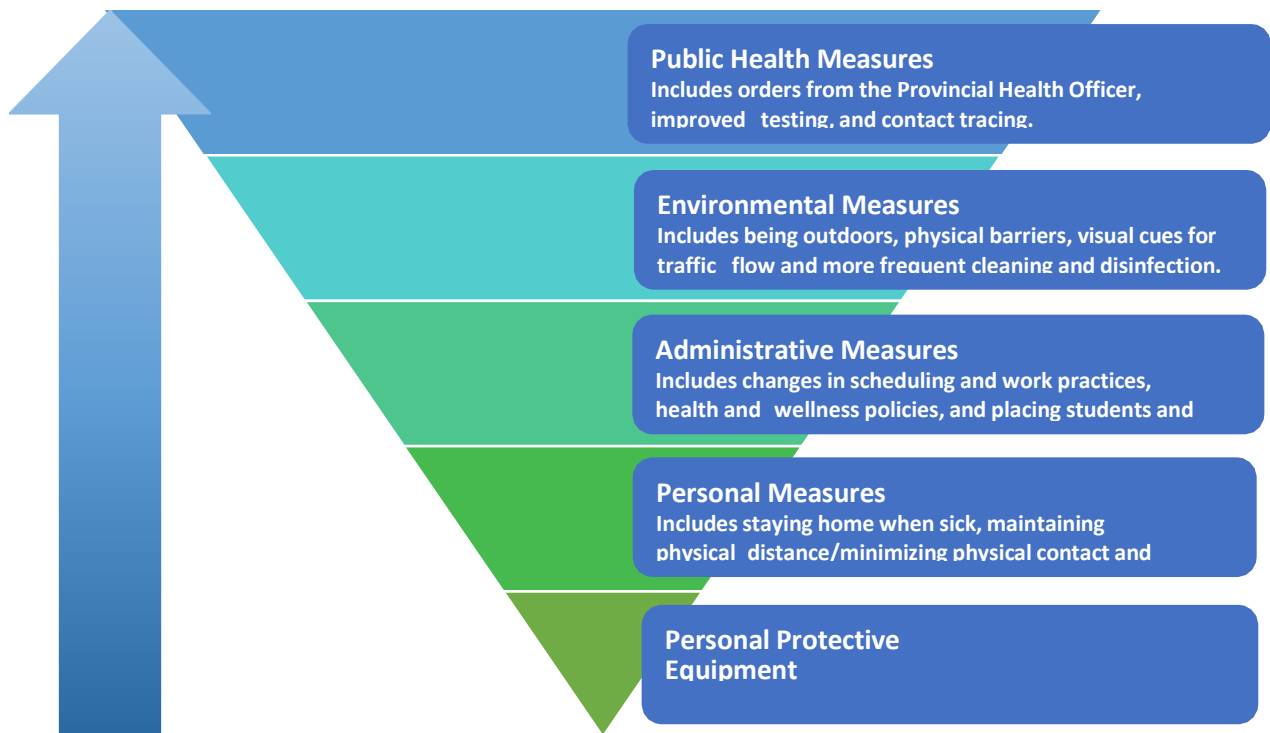
BC modelling studies in May 2020 suggested that partial re-opening of schools in June would have minimal impact on transmission in the short-term, provided vulnerable adults maintain physical distancing and symptomatic individuals self-isolate. These models assumed that smaller numbers of children were in attendance than usual.⁴⁰ Age specific and overall trends in BC cases suggest that school re-openings in June were not associated with an increase in COVID-19 cases.⁴¹ However, the June 2020 experience cannot be generalized to September 2020 because community transmission was then at a nadir, class sizes were much smaller than planned for the fall and the re-opening of schools was brief.

Schools are embedded in communities, and strong control of community transmission reduces the risk of COVID-19 in schools. During high levels of community transmission, cases, clusters and outbreaks in schools are expected. Communicating and responding to these events will need to be part of school re-opening plans. On the other hand, if community transmission is low the likelihood of school outbreaks is also reduced. Outbreaks in daycares, schools, and summer camps were all reported when either community prevalence was high and/or when public health measures were not followed. Cases of increased transmission in schools generally involved older student populations in instances when community transmission was high.

Overall, the risk of adults in school environments contracting SARS-CoV-2 from students is low. After reviewing the literature of school settings, the European Centre for Disease Prevention and Control concluded that children were not the primary driver of SARS-CoV-2 transmission to adults. The highest risk to staff in school settings is likely from other staff, but generally not higher than the risk of transmission in the community. Likewise, the risk for parents is generally low, particularly with younger children, and again, not higher than the risk of transmission in the community.⁴²

Approaches to Reducing the Risk of COVID-19 Transmission

A variety of frameworks and documents have been created and provided to guide COVID-19 prevention in schools. The hierarchy of controls framework from The National Institute for Occupational Safety and Health,⁴³ has been adapted from the health care setting, to provide a way of thinking about COVID-19 prevention in the community. It describes the multiple layers of prevention and control measures that can prevent transmission of communicable diseases, including SARS-CoV-2.



COVID-19 Public Health Guidance for K-12 School Settings, 2020.

Environmental and administrative measures such as lowering classroom occupancy, enhanced cleaning and disinfection, as well as personal measures to increase physical distance, hand hygiene, and self-isolation are all important strategies to reduce transmission. These strategies are outlined in the [COVID-19 Public Health Guidance for K-12 School Settings](#)⁴⁴ as well as the [COVID-19: Guidance for School Re-opening](#) document developed by the Hospital for Sick Children.⁴⁵

The COVID-19 Public Health Guidance for K-12 settings is used by the Ministry of Education to develop their [return to school plan](#) and is the reference for the Health and Safety Guidelines which used by school districts to develop operational health and safety plans.

A multi-modal approach to prevention will be implemented in schools, including extra hand washing, physical distancing with smaller classes / cohorting, being outside when possible, active screening, and keeping sick children, teachers, and staff from school. To respond to cases, clusters and outbreaks, public health will work with schools to provide rapid access to testing and contact tracing.

While these frameworks and documents provide high level guidance, to be successful, public health and schools will need to work closely during the coming school year to implement and evaluate prevention and response plans and adjust them as necessary.

Unintended Effects of School Closures

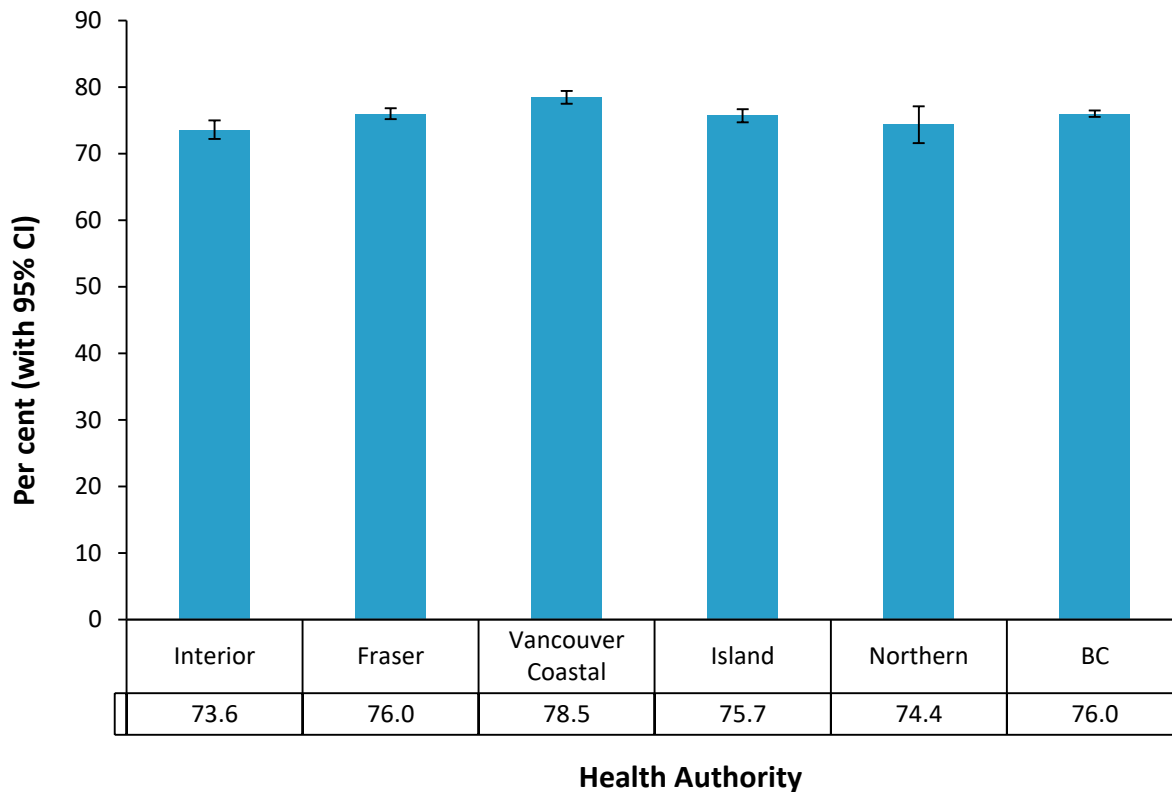
School closures can have unintended consequences for children and youth. In addition to learning, families and children rely on schools for social engagement, structured opportunities for physical activity, food access, access to some health services, and psychosocial support,⁴⁶ as well as enabling time for working parents to balance work and caregiving demands. Schools are key in reducing inequities across society by supporting equitable access to resources for children and youth to learn and develop. The impact of school closures and, more broadly, of the COVID-19 pandemic, is likely to be experienced inequitably, or may even generate new inequities.⁴⁷ The following is a summary of global literature and BC data on unintended effects of school closures on children, youth, and families during the COVID-19 pandemic.

Effects on learning

Educational attainment is an important determinant of health, positive well-being and future socio-economic outcomes.⁴⁸ Pandemic school closures and the shift to distance education have affected child and youth learning and may result in uneven educational opportunities. Learning insecurity is exacerbated in homes with limited access to technology, multiple platforms used by multiple teachers requiring time and learning by parents and students, school differences providing effective distance learning, as well as home instability and overcrowding. Up to 80% of children with disabilities, neurodevelopmental, mental, and behavioural health needs rely heavily on school services and may be particularly affected due to loss of resources, specialized educators, and structured learning environments.⁴⁹ According to BC's Ministry of Child & Family Development there are ~74,000 children and youth with special needs in BC, with ~21,000 receiving regular supports and funding.⁵⁰ Up to 30% of families surveyed by school districts reported having access to no technology at all when schools closed in March, and subsequently school districts provided creative solutions to increase technology access for families to engage in online learning.⁵¹

A majority of BC families reported effects on learning during school closures, which may worsen existing disparities in cognitive development and literacy. According to BCCDC's COVID-19 SPEAK survey, 76.0% (95% confidence interval [CI]: 75.5%, 76.5%) of respondents with school-aged children reported impaired learning (see Figure 1).⁵² Vulnerabilities in educational attainment and development exist in BC and vary by socioeconomic status, gender and geographic area.⁵³ These may be further exacerbated by school closures. A UK study determined the gender gap between girls and boys in reading widened from 2 to 11% during the pandemic.⁵⁴

Figure 1: Percentage of Household* Children Experiencing Impaired Learning as a Result of COVID-19 by Health Authority BC, 2020



* Among households with school-aged children.

Notes: Responses were weighted using 2016 National Household Survey data by age, sex, and Local Health Area.

Source: BC COVID Population Health Survey. Prepared by BC COVID-19 SPEAK Analysis Group, June 2020; Population

Stress, mental well-being, and school connectedness

Trends in mental health disorders and perceived need for services for children and youth have increased over recent decades⁵⁵ and are an important predictor of future mental health outcomes in the absence of early identification and intervention.^{56,57}

Youth may be particularly susceptible to adverse effects of school closures on stress, mental health, and connectedness. School connectedness is associated with numerous benefits for students including higher self-esteem and life satisfaction⁵⁸, lower rates of substance use and violence,⁵⁹ participation in fewer risk-taking behaviours,⁶⁰ increased likelihood of completing secondary school,⁶¹ and greater feelings of positive mental health.

As children and youth are isolated from peers, teachers, extended families and community networks, mental health conditions may increase. School closures and physical distancing may result in increased loneliness in children and youth during the COVID-19 pandemic, correlated with mental health effects including anxiety and depression in a review of 63 studies.⁶² Likewise, a review of 38 studies found declining mental health for children and youth during the COVID-19 pandemic. This review particularly highlighted trends in heightened anxiety, however results were based mainly on cross-sectional studies,

so long term effects are unclear.⁶³ A systematic review and meta-analysis is currently underway to assess the psychological impacts of COVID-19 on children and adolescents.⁶⁴

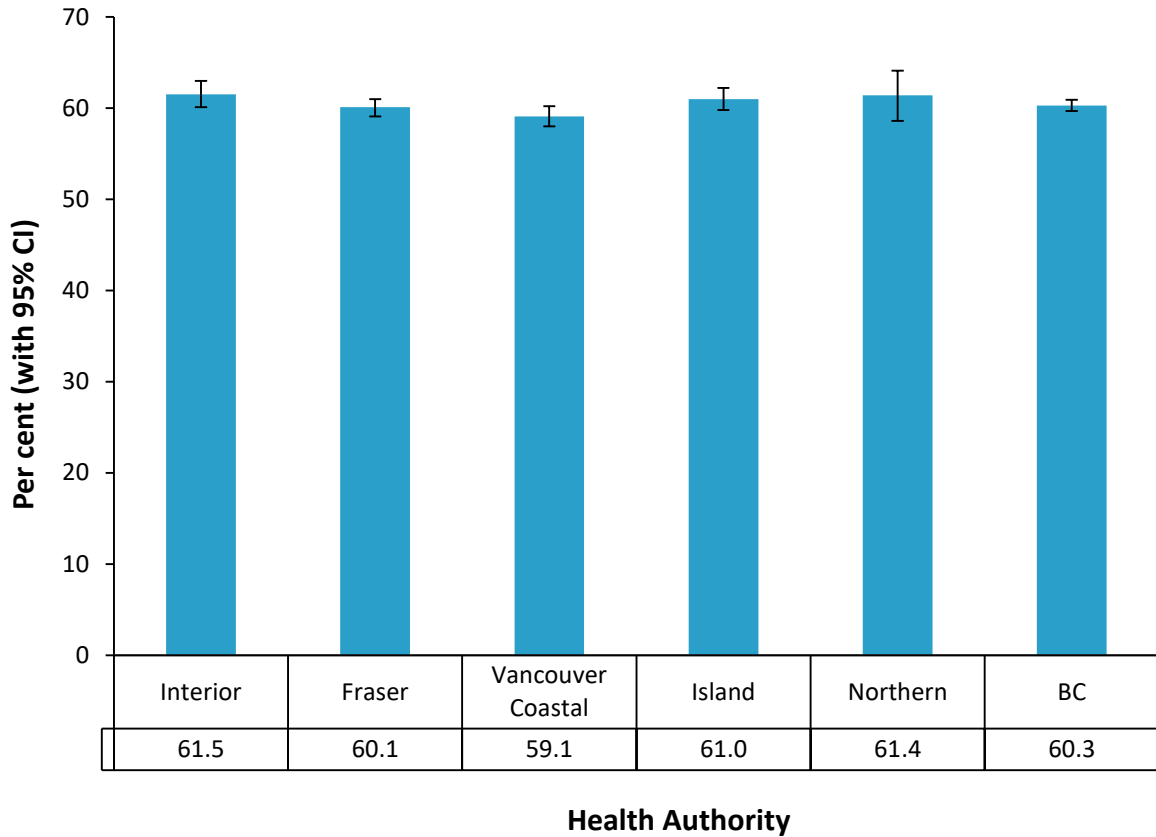
BC families reported increased child stress and decreased social connection due to the pandemic. According to the recent BC COVID-19 Speak survey, 60.3% (95% CI: 59.7%, 60.9%) of households with children reported increased child stress (Figure 2), while 79.2% (95% CI: 78.7%, 79.7%) of households with children report decreased connection with friends (Figure 3) as a result of school closures.⁶⁵

In 2018, a majority of students (96%) reported having at least one close friend in their school or neighbourhood, and 81% had three or more, associated with a number of positive outcomes, while 60% of youth reported feeling connected to their school.⁶⁶ Notably, a significant proportion of students (86%) reported feeling stressed in the past month, including 12% who reported being so stressed that they could not function properly.⁶⁷ Increased stress and decreased connection during the pandemic may be important contributors to future mental health and are important to prevent and monitor.

Schools are key settings for mental well-being promotion and access to mental health services. Social and emotional learning curricula foster positive personal attitudes, positive relationships, school connection, and improved academic performance, while reducing emotional distress and conduct problems.⁶⁸ Teachers, school counsellors and social workers are an important source of emotional and mental health support for students, and school closures may result in barriers to mental health resources and services usually accessed through schools.⁶⁹ In 2018, 55% of students had asked a teacher for help, 31% had asked a school counsellor and 23% had asked other school staff.⁷⁰ BC recently invested new funding to promote mental health in schools; there has been a loss of momentum as a result of school closures, delaying work that parents and families had identified as critical.^{71,72,73}

School attendance can be a major source of stress and anxiety for many students. Health service utilization data has demonstrated an increase in emergency mental health visits around 'back to school' periods. A recent analysis found the number of mental health and substance use related visits at the BC Children's Hospital (BCCH) emergency department between 2017 to 2019 varied from an average of 94 visits per month during the summer holiday period to 136 visits per month during the school year ($p < 0.0001$).⁷⁴ Population level data suggests an association between psychiatric crises and school days compared to holidays and weekends, an association isolated to school age children and disappearing around young adulthood.⁷⁵ In 2018, while 73% of youth rated their mental health as good or excellent, rates had declined from 2013, and 15% of BC students reported missing classes in the past month because of mental health problems.⁷⁶ It will be particularly important to monitor and proactively address student mental health needs when schools resume, as stress and mental health effects may be more pronounced for some students.

Figure 2: Percentage of Households* With Increased Child Stress as a Result of COVID-19 by Health Authority BC, 2020

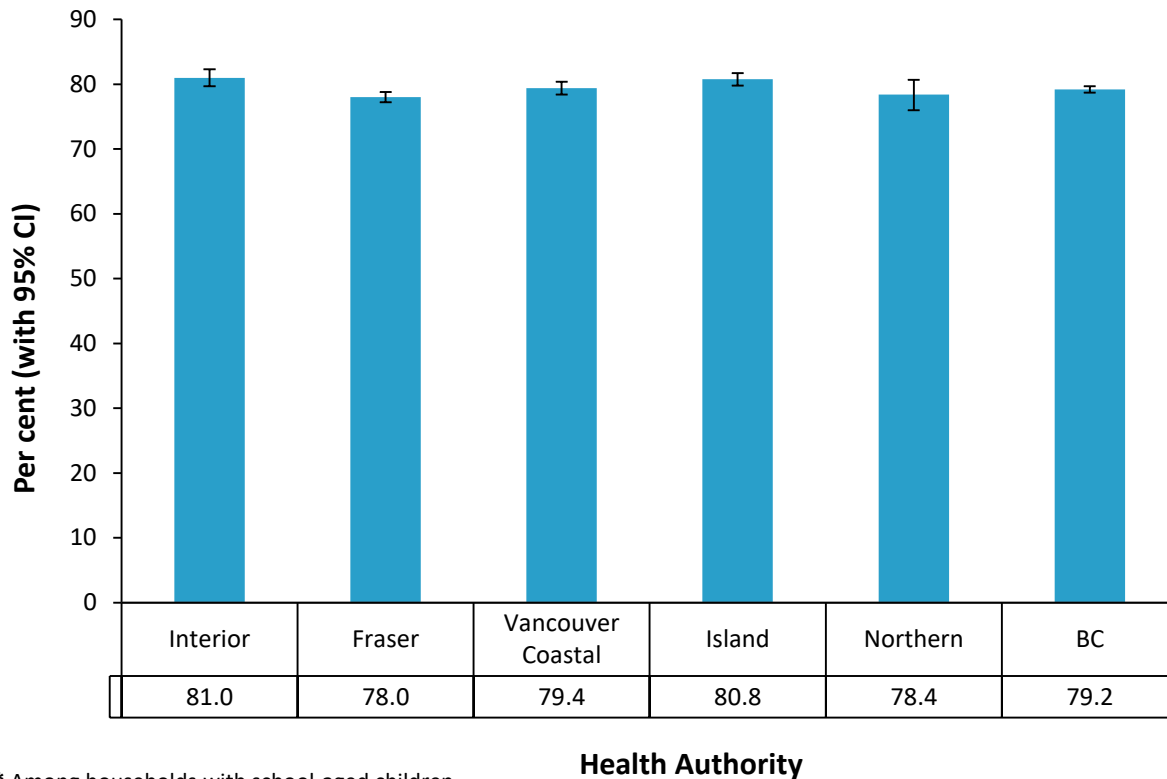


* Among households with school-aged children.

Notes: Responses were weighted using 2016 National Household Survey data by age, sex, and Local Health Area.

Source: BC COVID Population Health Survey. Prepared by BC COVID-19 SPEAK Analysis Group, June 2020; Population

Figure 3: Percentage of Household* Children With Decreased Connection With Friends as a result of COVID-19 by Health Authority, BC, 2020



* Among households with school-aged children.

Notes: Responses were weighted using 2016 National Household Survey data by age, sex, and Local Health Area.

Source: BC COVID Population Health Survey. Prepared by BC COVID-19 SPEAK Analysis Group, June 2020; Population

Family stress

School closures may contribute to greater family stress, especially for female caregivers, while families balance child care and home learning with employment demands. A recent review of 38 studies concluded that families with children have been under considerable strain in the context of COVID-19, noting greater fear and anxiety in families with children.⁷⁷ Mothers with school aged children disproportionately experienced reduced hours, job losses, and a greater caregiving burden during the COVID pandemic. The gender work gap is estimated to have increased by 20-50%.⁷⁸ Similarly, a Spanish survey found a higher level of pandemic related psychological distress in families with affected working situations with children under age 16.⁷⁹ Single mothers, Indigenous households, and recent immigrants are among those most likely to experience greater stress during the pandemic due to work interruption and the effect on regular earnings needed for financial stability.⁸⁰ A lack of respite care for families of youth with special needs has been identified a key source of stress for many families. Studies are underway to further assess the effects on child and family well-being.

Family violence

A growing body of evidence suggest family violence may be on the rise during the COVID pandemic, while the closure of schools and childcare centres may create a gap in the safety net for children who are at risk of abuse and neglect. Financial strain, isolation, and substance use are risk factors for family violence that worsen during the pandemic.⁸¹ A combination of school closures, social distancing, and economic consequences have resulted in more parents at home while children engage in home learning. Greater family proximity may result in increased family cohesion for some. For others, it can lead to increased tension (having more people around all the time while juggling work and caregiving) or increase exposure to abusive relationships and negative coping mechanisms (such as alcohol use) At the same time, reduced external oversight and access to school services can impair detection of childhood abuse and neglect.⁸² Vulnerable populations during the COVID pandemic may include children with behavioural health needs or disabilities, those in foster care or at risk for maltreatment, children with disabilities, and families experiencing underlying social inequities.⁸³ A recent Fraser Mustard Institute review of the effects of pandemics on children in care highlighted an increased risk of physical and emotional maltreatment, gender-based violence, separation from caregivers, social exclusion, and decreased access to in-home child welfare services.⁸⁴

Global reports suggest domestic violence has intensified during the pandemic. In Australia, internet searches for domestic violence support increased 75%, while France, US and the UK report a ~30% increase respectively in domestic abuse complaints, shelter usage and calls to telephone hotlines following implementation of pandemic measures.⁸⁵ Although Canadian data are not yet available, reports from federal sources indicate a 20-30% increase in domestic violence in certain regions.⁸⁶ Careful assessment is required to determine whether family violence and abuse towards children has intensified in BC.

Schools in BC must report child/youth maltreatment. School closures may have affected abuse detection. BC's Ministry of Child and Family Development received 23% fewer child protection reports in May/June 2020 compared to 2019, with 75% fewer protection reports from schools, suggesting teachers and support staff play a valuable role in protecting vulnerable children.⁸⁷ At baseline, data from 2013 suggests 29.4/1000 children and youth in BC are exposed to neglect or abuse.⁸⁸ In 2018, 14% of students in Grade 7-12 reported physical abuse and 11% reported sexual abuse, more likely among females and non-binary youth.⁸⁹ Family violence and child abuse has significant deleterious health and social sequelae well into the future⁹⁰ and is critical to track and address proactively. Priorities for action to recognize and prevent adverse child experiences (ACE) were addressed at a recent summit led by the Child and Youth Mental Health and Substance Use Communities of Practice, including advocating for childhood trauma prevention and improved screening and services for those affected by ACE¹.⁹¹

¹ Adverse childhood experiences (ACE) are traumatizing events that occur during childhood and adolescence. To date, research has focused primarily on three broad categories of ACEs: abuse (emotional, physical, or sexual), neglect, and household dysfunction (e.g., divorce, parental conflict, substance abuse). (cross reference footnote 82)

Food insecurity

Food insecurity has surged globally through the pandemic.⁹² Research shows a relationship between hunger and impaired learning, as well as negative health outcomes including lasting mental health outcomes.⁹³ During the COVID-19 pandemic, almost one in seven (14.6%) Canadian households reported food insecurity in the past 30 days, with 2% reporting severe food insecurity. For comparison, pre-pandemic data from the Canadian Community Health Survey identified 10.5% of Canadian households as food insecure. Households whose employment was affected during the pandemic reported the greatest food insecurity (28.4%) compared to those with consistent work (10.7%) or those who were unemployed prior to the pandemic (16.8%). A higher proportion of food insecurity occurred among households with children (19.2%) compared to those living with no children (12.2%).⁹⁴

Food insecurity is heavily influenced by social determinants. Many families face numerous barriers (poverty, lack of stable housing, lack of transportation to food stores/markets, etc.) to accessing culturally appropriate, healthy foods. As well, geographic factors affect food access (distance to food sources, rural and remoteness, cost of food, etc.). In 2018, 1 in 10 BC students went to bed hungry because there was not enough money for food at home.⁹⁵

Schools provide an important source of nutrition for many school-aged children and are a key element of food security. School food programs support student learning and success at school, increase intake of healthy foods and contribute to reducing risk of chronic disease later in life. Through the Ministry of Education's CommunityLink funding, the majority of BC public schools regularly provide some form of school food (breakfast, lunch, and/or snacks) to their most vulnerable students, with 75% of school districts having a meal program in at least one school.⁹⁶ When in-person instruction was suspended, the BC Ministry of Education advised school districts to continue providing meal program; 75,000 meals were delivered to 16,000 families every week.⁹⁷ Anecdotal information suggests that the number of families seeking support from school food programming increased considerably during this time.⁹⁸

Health behaviours

School closures and pandemic measures can have a significant effect on children's health behaviours. Regular physical activity⁹⁹, sleep duration¹⁰⁰, and healthy eating¹⁰¹ all affect the physical and mental health of children and youth.¹⁰² Health behaviours are largely influenced by an individual's social and physical environment, as well as the resources and opportunities available. Social determinants, including experiences of poverty and racism, have a significant influence on health and mediate the relationship between health and lifestyle behaviours.

School closures and pandemic measures may affect protective and supportive social structures and routines, as well as access to environments and opportunities integral to supporting children's physical, emotional, and mental well-being. Children typically obtain most of their daily physical activity through active travel to school, physical education, recess, organized sports, and playground time, with more sedentary behaviour at home and during summer months.¹⁰³ School closures can lead to a loss of structure and routine, decreased recreation opportunities and increased sedentary activities such as screens.¹⁰⁴ Schools provide school meal and snack programs and school-based education opportunities, while the loss of structure and routines directly affect nutrition as it becomes more challenging to develop consistent eating and feeding routines for families. As schools and extra-curricular activities were cancelled, parks, playgrounds, recreation centres, and gyms closed, stay at home recommendations were made, access to grocery stores became more difficult, and families scrambled to

juggle work and home school priorities. These factors coalesced in the COVID-19 pandemic to affect children's health in a myriad of ways.

Global data suggest that the pandemic and school closures had a significant effect on health behaviours of children and youth. A national survey found that only 4.8% (2.8% girls, 6.5% boys) of children and 0.6% (0.8% girls, 0.5% boys) of youth were meeting combined movement behaviour guidelines during COVID-19 restrictions.¹⁰⁵ A study of Italian youth comparing before and during the pandemic noted increased intake of sugary drinks, potato chips, and red meat, decreased time in sports activities, and increased sleep and screen time.¹⁰⁶ A study of 2400 adolescents in China immediately before and during the pandemic observed an average 435 minute reduction per week (from 540 to 105 min) of physical activity, while the proportion of physically inactive students (< 30 min/day) rose from 21% to 65%, and screen time increased by an average of 30 hours per week.¹⁰⁷ An increase in smartphone and social media use was noted among youth in China during lockdown, with problematic internet behaviours predictive of psychological distress.¹⁰⁸

Prolonged closures may worsen existing trends for BC children and youth. At baseline, among Canadian children 5 to 17, approximately 40% meet physical activity guidelines, with males and children 5-11 years close to twice as likely respectively to meet recommendations.¹⁰⁹ 11.6% of Canadian youth age 5-17 report drinking sugar sweetened beverages daily while 53% meet recommended sedentary behaviour guidelines.¹¹⁰ In BC, in 2018 only 18% of BC youth aged 12-17 meet physical activity guidelines, with 24% of males and 12% of females exercising daily. Under half (48%) of students slept for 8 or more hours per night, with just under half reporting going offline after expected bedtime.¹¹¹ Over time, the effects of reduced physical activity, poor nutrition and excess screen time may be contributors to adolescent depression,¹¹² anxiety¹¹³ and other negative health effects.^{114,115}

Schools are important settings for health promotion, and for provision of resources for those who may experience disadvantage at home. In the context of ongoing closures or school disruptions, it will be important to explore strategies to mitigate the impact of ongoing pandemic restrictions. Exploring opportunities for outdoor classrooms¹¹⁶ for school re-entry may be an important way to facilitate learning, development and physical activity, as well as to reduce COVID-19 transmission.

Equity

As reflected in the examples above, populations subject to social inequities are likely to experience greater adverse effects from school closures during the COVID-19 pandemic. Escalating financial, social, and psychological stress may increase family stress, direct exposure to violence, food insecurity, and housing instability. Limited access to health care, closure of daycares, employment and financial instability compound the effects of school closures and may have greater impacts on single parent families, families in poverty, and those with unstable employment or housing.¹¹⁷ Health outcomes concentrate disproportionately along social gradients, influenced by inequitable structural factors as core contributors to adverse health effects and behaviours.¹¹⁸ Social determinants such as poverty and racism have a significant influence on health and mediate the relationship between health and individual lifestyle behaviours. BC has the second highest child poverty rate in Canada at 20%,¹¹⁹ which is of particular concern as those with fewest resources and greatest stress may be most at risk of detrimental educational, social, and health ramifications related to extended school closures. Ongoing active data collection stratified by social determinants is critical to prevent widening of existing health

disparities. We have a unique opportunity to use current platforms to advocate for pragmatic action to address underlying social and structural inequities that are driving learning and health disparities related to school closures for children and families across BC.

Impacts on Indigenous Populations

Understanding the experiences and priorities of Indigenous populations is essential to Truth and Reconciliation.¹²⁰ No studies of the effect of school closures on Indigenous populations were found. Concern has been expressed that the effects of the pandemic may be disproportionately experienced by Indigenous peoples,¹²¹ due to the effect of ongoing racism, social exclusion, and structural violence on the health and well-being of Indigenous children, families and communities.¹²² However, Indigenous peoples and communities are resilient and have drawn on their collective strength and connectedness to buffer the adverse experiences of the pandemic.¹²³ It is essential that Indigenous people are engaged to speak to Indigenous ways of knowing and being and to their experiences – both challenges and successes – in managing school closures and the pandemic more broadly, the effects on children and families in rural, remote and urban settings, as well as to direct needed future work.

Strengths, Limitations and Future Opportunities

The information reviewed in this document is a summary of the available evidence and information available currently. However, the scientific literature will increase considerably as the pandemic progresses. Data from the BCCDC COVID-Speak survey centred primarily on the parental experience of COVID and their interpretation of their children's experience, with no direct input from children.

As highlighted above, schools can be a source of stress and anxiety for many students, and there may be potential positive impacts related to school closures and pandemic restrictions on family connectedness and longer term mental well-being, which have not been reported in the literature to date. While it is likely that the impact of abrupt school closures was a negative experience for many, with teachers having to rapidly pull together distance learning and parents unprepared for this change, it may not necessarily be the same experience in future if the system adapts to the needs of students and families over the longer term.

It also should be noted that benefits were not discussed in this paper. There may be positive effects of more family time together, such as eating meals together, improving connectedness and food skills development. However, these are not yet available in the published literature.

Finally, this unprecedented experience underlines the importance of schools in society, particularly their role in creating healthy environments, providing social supports, and improving equity. This may be a valuable opportunity to focus on the opportunity to implement sustainable comprehensive school health approaches to improve the health of children and their families.

Summary

- Schools were closed proactively across BC in March 2020 as part of the effort to flatten the epidemic peak in anticipation of a COVID-19 pandemic surge. This decision was largely based on assumptions and evidence from prior influenza outbreaks.
- Since March 2020, more has been learned about the epidemiology of COVID-19 in children. Children and youth have milder disease with infection than adults. Complications can occur, but are rare.
- Children do not appear to be a major source of SARS-CoV-2 transmission in households or schools
- Lower susceptibility to disease and lower transmission potential of children may render school closures less effective in preventing community transmission of COVID-19.
- With some exceptions, global evidence to date suggests that schools have not been an important source of transmission of SARS-CoV-2
- School re-opening has not been associated with an increase in outbreaks or widespread community transmission.
- Schools are embedded in communities, and strong control of community transmission reduces the risk of COVID-19 in schools. During higher levels of community transmission, cases, clusters and outbreaks in schools can be expected. Communicating and responding to these events will need to be part of school re-opening plans. On the other hand, if community transmission is low the likelihood of school outbreaks is also reduced.
- Implementing infection prevention and exposure control measures both in schools and in the community will help mitigate risk and allow schools to re-open or stay open without substantial increases in COVID-19 transmission.
- Schools have protective effects on child and youth cognitive, social, emotional & physical well-being and are a valuable source of nutrition, social resources and support.
- Evidence from global literature and available BC and Canadian data suggest children and youth experience a range of adverse effects from school closures including interrupted learning, increased child stress, decreased connection, increased loneliness and mental health problems, decreased access to health promoting environments and declining healthy behaviours, decreased food access and a lack of detection and support in situations of family violence.
- Adverse effects are likely to be experienced disproportionately by those subject to social inequities, widening existing health disparities.
- In most cases, school closures have occurred simultaneously with physical distancing and other public health measures implemented throughout communities, making it difficult to isolate the specific effects of school closures. However, a loss of school resources, connections, and support compound the broader societal impact of the pandemic.
- Given evidence suggesting an impact on children's mental health during school closures in the pandemic, as well as previous data demonstrating an increase in emergency mental health visits around 'back to school' periods, ensuring access to services and mental health support at the time of re-entry for the new school year will be essential.

Recommendations

- Prioritize school re-opening in BC as a critical measure to promote and protect the health and well-being of children, youth, and their families
- Continue community measures to keep community transmission low to support school re-opening.
- Given the importance of in-person instruction for all ages, re-open in-person instruction for all grades while supporting the health and safety of children and staff.
- With support of public health, implement public health and infection prevention and exposure control measures in schools described in the [COVID-19 Public Health Guidance for K-12 School Settings](#) in BC
- Evaluate and adjust safety plans as needed.
- Consider the differences by age in COVID-19 characteristics, social networks, and ability to adhere to prevention measures in safety plans of elementary, middle and secondary schools.
- With support of public health, develop and communicate a COVID-19 response plan for schools that includes surveillance, testing, staying home from school when sick and contact tracing.
- Develop flexible and supportive absence policies for students and leave policies for staff.
- Support students who are staying home when sick to maintain educational continuity.
- Increase access to counselling, psychosocial health supports in school, along with emergency mental health supports and services at the time of school re-entry is critical.
- Continue research and monitoring of unintended consequences of school closures and disruptions on children, youth, and families (including child learning, health and development indicators, the effect of school absences, the impact of virtual learning etc.)
- Support ongoing research in the epidemiology of COVID-19 in partnership between public health, infection control, pediatric infectious disease specialists, and other child health providers.

Appendix

Work and research studies are currently underway to better understand the effect of school closures on children and youth, their families, and society in general. The section below describes a selection of ongoing research studies at BC Children's Hospital and BC Centre for Disease Control.



Dr. Laura Sauvé:
Investigator, BC Children's Hospital;
Clinical Assistant Professor, Division of Infectious Diseases, Department of Pediatrics, Faculty of Medicine, UBC;
Chair, Infectious Diseases and Immunization Committee, Canadian Pediatric Society.

COVID-19 and children: A comprehensive series of studies

Dr. Laura Sauvé is a pediatric infectious diseases specialist who also works in infection control and has been the lead in the BC Children's Hospital / BC Women's Hospital COVID-19 infection control response. As such, Dr. Sauvé has been responsible for implementing infection control policies around children and COVID-19. Most of her work has been in developing guidelines based on the literature, coordinating the pediatric COVID-19 guideline development on the BCCDC website, and participating in the review process for the Clinical Reference Group (initially chaired by David Patrick). As chair of the Canadian Pediatric Society's Infectious Diseases and Immunization Committee, Dr. Sauvé leads development of all infectious diseases guidance from the CPS and including review of all COVID-19 guidance.

"School closure and online learning most disadvantage children who face challenges of the social determinants of health — those living in poverty, those whose parents have limited literacy, those who count on school meals because of food insecurity, those whose families don't have access to computers or internet, children threatened by non-accidental trauma or violence in the home. For all children, an important part of school is the social and emotional learning that comes with working in a class with other children; paired with careful planning and investment towards minimizing the risk of COVID-19 transmission in school, using the hierarchy of controls, and considering the ongoing transmission in the community." —Dr. Laura Sauvé

Dr. Sauvé is a co-investigator on Dr. Sadarangani's COVID-19 in children study (detailed below). Dr. Sauvé is also a co-investigator on the following studies:

Project title 1: Rapid reviews of literature on pediatric COVID-19

Description: Providing baseline information for HECC public health guidance for K-12 school settings.

Principal Investigator: Dr. Kevan Jacobsen, Investigator, BC Children's Hospital; Associate Member, Department of Physiology, University of British Columbia; Head, Division of Gastroenterology, Hepatology and Nutrition, Department of Pediatrics, Faculty of Medicine, University of British Columbia

Project title 2: COVID-19 and children with comorbidities: a meta analysis and systematic review

Description: This systematic review pulls together the published literature as it stands to assess the effects of COVID-19 on children with comorbidities in order to allow risk assessment for providers of children with comorbidities. The data so far is limited, however of the minority of children who become severely ill with COVID-19, more of them have underlying medical conditions.

Principal Investigator: Dr. David Goldfarb, Investigator, BC Children's Hospital; Medical Microbiologist, BC Children's Hospital

Project title 3: Children and mask wearing study (proposal in development)

Description: The proposed study is a pilot study to examine mask wearing in children. The study will examine whether children aged 6-11 years old are able to correctly wear masks and if mask-wearing impacts the frequency of face touching. Results will provide feasibility data and inform if future studies on masking in children are achievable using this intervention. This study will also inform if conducting further studies on masking in children would be beneficial.

Principal Investigator: Dr. Deborah Money, Executive Vice-Dean, Faculty of Medicine, University of British Columbia; Clinical Professor, Division of Infectious Diseases

Project title 4: Canadian surveillance of COVID-19 in pregnancy: Epidemiology and maternal and infant outcomes

Description: Due to the paucity of data on COVID-19 in pregnancy, the team mobilized an established network of care providers. Leads in each province/territory were engaged to develop an approach for identification of all cases of SARS-CoV-2 in pregnancy and collection of outcome data for mothers and infants. Women with documented infection in pregnancy are identified by public health and/or clinically identified prospectively via medical records. Data collection forms were designed to ensure harmonization between Canadian provinces/territories and with international networks (e.g., COVI-PREG, WHO).



Dr. Trevor Corneil
MD MSc FCFP FRCPC
Senior Medical
Advisor, BC Centre
for Disease Control,
Ministry of Health.



Christie Docking: RD,
BSc, MPH

Acting Director,
Special Projects,
Population Public
Health, Ministry of
Health

Most children in B.C. deemed safe to return to school in September

Project title: COVID-19 public health guidance for K-12 settings

Description: The low prevalence of COVID-19 in B.C. — particularly amongst school-aged children, the likelihood of children to have mild symptoms of COVID-19 (if any), and the ability to consistently implement effective infection prevention and exposure control measures has enabled most students to return to in-person learning in September.

"The COVID-19 public health guidance for K-12 settings provides direction and recommendations for educators, administrators, and support staff at public, independent, and First Nations schools to minimize the transmission of COVID-19 and maintain a safe and healthy school environment." —Dr. Trevor Corneil and Christie Docking

The COVID-19 public health guidance for K-12 settings is developed collaboratively by partners across the health and education sectors. Using evidence summaries generated by BC Children's Hospital, BC Centre for Disease Control, and the Office of the Provincial Health Officer; expert public health medical opinion; and education-sector perspectives, the guidelines reflect a B.C.-specific approach to school reopening. Future revisions will occur to ensure alignment with emerging evidence and community prevalence of COVID-19 in B.C.



Dr. Michael Kobor:
Investigator, BC
Children's Hospital;
Investigator, Centre
for Molecular
Medicine and
Therapeutics; Sunny
Hill BC Leadership
Chair in Child
Development, Tier 1
Canada Research
Chair in Social
Epigenetics;
Professor,
Department of
Medical Genetics,
Faculty of Medicine,
UBC.

The hidden impact of COVID-related societal stress on children

Project title: A bio-ecological integrative approach to understanding the 'hidden costs' of COVID-19 on children

Description: COVID-19 has quickly and dramatically changed society. The pandemic may impact children's physical and psychological health in ways not directly related to infection with the virus. For many children and youth, the main stressors during this time may be linked to the economic downturn and unintended consequences of physical distancing and school closure.

"Since early life comprises a sensitive period for long-term embedding of experiences and exposures, children might be at particularly high risk from these COVID-related societal stressors." —Dr. Michael Kobor

A cross-disciplinary team will integrate biological, behavioural, and sociological data to assess long-term impacts of the COVID-19 pandemic on children. The team will examine associations between data on epigenetics, the microbiome, immunological measures, and child behavioural measures and link these data to administrative datasets. They will also create and distribute at home kits for citizen scientists to contribute data from the above categories. Their research will lead to the measurement, evaluation, and long-term follow-up of the effects of COVID-19 on children at a population level.



Dr. Hasina Samji:
Assistant Professor,
Faculty of Health
Sciences, SFU; Senior
Scientist, BC Centre
for Disease Control,
Provincial Health
Services Authority;
Research Associate,
Centre for Applied
Research in Mental
Health and
Addictions

Which subpopulations of youth have been most impacted by school closures?

Project title: Predicting successful well-being trajectories from childhood to emerging adulthood using the Youth Development Instrument (YDI)

Description: Behaviours and life skills that promote wellbeing and enable young people to negotiate adversity are important for positive development leading to social and academic success and good health across the life course. Population-level longitudinal data using validated, standardized measures to identify wellbeing, risk and resilience factors as youth transition to emerging adulthood are largely lacking.

"In the context of the COVID-19 pandemic, it is imperative that young people's voices are represented and directly inform policies that affect their health, wellbeing, and learning." —Dr. Hasina Samj

The team will create the Youth Development Instrument (YDI) to identify the individual and contextual resources, opportunities, conditions, and practices that foster or hinder positive youth development. They will utilize administrative data to capture differential outcomes (e.g., in high school graduation, health services utilization, and mental illness diagnosis) for students with high COVID impact scores over the next five years. Subpopulations of youth who have been most adversely impacted by COVID containment responses — including school closures — will be identified through this research.



Dr. Evelyn Stewart:
Investigator &
Physician, BC
Children's Hospital;
Research Director,
Child, Youth and
Reproductive Mental
Health Programs,
BCCH; Professor,
Division of Clinical
and Behavioural
Neurosciences,
Department of
Psychiatry, Faculty of
Medicine, UBC.

*In collaboration with
Dr. Hasina Samji,
(featured above)*

Identifying mental health impacts and resources during the COVID-19 pandemic

Project title: COVID-19 impacts and mental health sequelae among children and families

Description: Healthcare leaders require the appropriate information in order to develop strategies to better match patient need with access, prepare for a potential "second wave" of COVID-19 and the resulting mental health impacts, and refine public health response measures.

"Our study will help identify mental health struggles and useful resources — including schools — over a nine-month period during the COVID-19 pandemic. Our findings will guide scaling up or development of new resources to address unmet mental health needs." —Dr. Evelyn Stewart

This is a longitudinal cohort surveillance study of 50,000 vulnerable and general population children and their parents that will capture data related to pre- and post-COVID era educational status, pandemic-related education delivery, school-mediated support, and mental health. Of note, children with developmental disabilities and learning disabilities represent a vulnerability group that has been targeted in this study's recruitment strategy. COVID-19 era mental health needs, supports obtained, and utility of online anxiety management will be quantified over time.



Dr. Quynh Doan:
Investigator &
Pediatric Emergency
Physician, BC
Children's Hospital;
Associate Professor,
Pediatric Emergency
Medicine,
Department of
Pediatrics, Faculty of
Medicine, UBC.

Anticipating a surge in youth emergency mental health visits

Project title: The impact of social distancing in response to the COVID-19 pandemic on mental health visits for self-harm in Canadian youth: A time-series analysis

Description: Most emergency departments across Canada have seen declining visit rates as children avoid the types of situations that might lead to environmental injuries and communicable diseases. However, these same emergency departments are bracing for a surge in visits stemming from the psychosocial impact of public health responses — including school closure and reopening during the pandemic.

"We believe that data demonstrating a temporal relationship between social distancing and mental health presentations for suicidal ideation and self-injurious behaviour must influence care for at-risk youth during the COVID-19 pandemic." —Dr. Quynh Doan

With a focus on high-risk groups such as females and youth aged 15-19 years, the researchers will continue to monitor emergency department utilization data as schools reopen in order to plan for acute mental health resources ahead of the expected surge in mental health-related visits. The team will continue to collect and analyze emergency department data related to mental health presentations at BC Children's and will combine data with other participating sites across Canada.



Dr. Manish Sadarangani:
Investigator, BC Children's Hospital; Director, Vaccine Evaluation Center; Sauder Family Chair in Pediatric Infectious Diseases, UBC; Assistant Professor, Department of Pediatrics, Faculty of Medicine, UBC.

How many kids and youth in BC have already had COVID-19?

Project title: Severe acute respiratory syndrome-related coronavirus 2 prevalence in children and young adults in British Columbia: A cross-sectional, observational study

Description: The spectrum of illness associated with COVID-19 has spanned from mild to severe, including acute respiratory distress syndrome and death. Since those under 25 are usually less severely affected by COVID-19 than older adults, it may be possible to be infected without showing symptoms.

"Our findings combined with those from similar studies carried out across B.C. will help us understand the spread of the virus and how to safely allow children and youth in B.C. to return to school, daycare, and other public spaces." —Dr. Manish Sadarangani

This study will collect clinical information along with blood and saliva samples from individuals under age 25 living in B.C. to help understand the rates of COVID-19 infection — even amongst those who may not have shown symptoms. Findings from this research will provide valuable information to help guide policy in B.C. on physical distancing and school reopening.



Dr. Sarka Lisonkova:
Investigator, BC
Children's Hospital;
Associate Professor,
Division of Maternal
Fetal Medicine,
Department of
Obstetrics and
Gynaecology, Faculty
of Medicine, UBC.

How can children's medical histories predict severity of COVID-19 infection?

Project title: All-cause and cause-specific mortality and acute morbidity attributable to COVID-19 and medical history associated with severe COVID-19 infection in B.C.

Description: Prediction models regarding the future course of the COVID-19 pandemic mainly rely on the trends in numbers of COVID-19-positive individuals, hospitalizations, and deaths. Comparisons of causes of hospitalization before and during the pandemic can identify children who are at risk for severe forms of Covid-19 disease. Temporal changes in morbidity not related to SARS-CoV-2 infection, including mental health disorders, will help to assess the indirect effects of the pandemic.

"Our research will provide insight into characteristics of children who are at high risk for developing severe COVID-19 disease and who might benefit from continued physical distancing, online learning, and other preventive measures." —Dr. Sarka Lisonkova

This project will identify children who are at elevated risk of severe COVID-19 disease (i.e., in need of hospitalization due to COVID-19) by identifying groups of people — with respect to age, sex, comorbidity, socioeconomic status, and other factors — who experienced increases in COVID-19- and non-COVID-19-related acute morbidity and mortality during the pandemic in B.C. It will also identify specific medical histories that are associated with increased severity of COVID-19 disease symptoms.



Dr. Julie Bettinger:
Investigator, BC
Children's Hospital &
Vaccine Evaluation
Center; Associate
Professor, Division of
Infectious Diseases,
Department of
Pediatrics, Faculty of
Medicine, UBC.

Cultural dimensions of the COVID-19 public health response

Project title: Understanding the effects of public health outbreak control policies and implementation on individuals and communities: A path to improving COVID-19 policy effectiveness

Description: While public health policies are required to control an infectious disease outbreak, these policies can be detrimental to the wellbeing of individuals and communities. Additionally, while healthcare providers are involved in administering the policy, they are also put at great risk in caring for patients.

"Quarantine, limitations on social gathering, and other restrictive measures during the COVID-19 pandemic can put a significant burden on individuals — which may be disproportionate depending on socioeconomic status and other factors." —Dr. Julie Bettinger and study co-investigators

This project will examine the cultural dimensions of the COVID-19 pandemic by looking at the ways individuals and communities understand and respond to public health measures. It will be a multi-province, multi-country (Canada, Bangladesh, China) study that utilizes qualitative and quantitative methodologies and will gather perspectives from the media, healthcare providers, patients, and members of the general public.



Dr. Ran Goldman:
Investigator, BC
Children's Hospital;
Co-Head, Division of
Clinical
Pharmacology,
Division of
Emergency
Medicine,
Department of
Pediatrics, UBC;
Professor,
Department of
Pediatrics, Faculty of
Medicine, UBC.

Where have all the pediatric emergency patients gone?

Project title: Tracking pediatric emergency department visits during the COVID-19 pandemic: Where did all the patients go?

Description: Pediatric emergency departments around the world have seen a significant decline in visits during the COVID-19 pandemic. Similar changes have been recorded at BC Children's Hospital with a 17 per cent reduction in visits since the first COVID-19 case and a decrease of 57 per cent during the peak pandemic period compared to the same time last year.

"To ensure care for sick children, school reopening should be coordinated with emergency care availability, and the message should be clear to parents that there is no need to delay accessing emergency care for COVID- or non-COVID-related illness." —Dr. Ran Goldman

The researchers analyzed emergency department visit data from BC Children's Hospital and compared four periods: pre-pandemic, early pandemic, peak pandemic, and the same period last year. While visits had decreased, the rate of admissions significantly increased during peak epidemic by 40 per cent compared to pre-pandemic and 28 per cent compared to last year. The team will continue to monitor emergency visits at BC Children's Hospital in order to offer a glimpse into post-pandemic needs.



Dr. Mariana Brussoni:

Investigator, BC Children's Hospital; Academic Scientist, BC Injury Research and Prevention Unit; Associate Professor, School of Population and Public Health & Associate Professor, Department of Pediatrics, Faculty of Medicine, UBC.

Children are safest when classes take place outdoors

Dr. Brussoni's work has mainly focused on knowledge mobilization, which has taken many forms during the COVID-19 pandemic. She was involved in a national survey of parents looking at children's movement behaviours and outdoor play during lockdown. Dr. Brussoni has also been involved in distilling the latest information related to the outdoors and writing articles to support people's access to this information. She has conducted a number of webinars with early childhood educators and was a guest on two podcasts regarding COVID and outdoor play. Dr. Brussoni keeps a close eye on the research and BCCDC recommendations in order to distill these down to what it means for childcare settings, schools, and communities. This has involved a strong push to move childcare and education outdoors.

"Having adequate ventilation is at the top of public health measures to reduce the spread of SARS-CoV-2, outside of keeping people apart altogether. We have strong evidence that transmission is less likely to occur outside. In addition to the benefits of the outdoors for development, learning, and physical activity, the best ventilation is outdoors." —Dr. Mariana Brussoni



Dr. Tyler Black:
Psychiatrist, Child
and Adolescent
Psychiatric
Emergency Unit, BC
Children's Hospital.

More pediatric suicides occur when school is in session

Project title: The association between school days and pediatric death by suicide

Description: Suicide and child mental wellbeing are frequently cited as considerations for reopening schools. However, it has been observed that — prior to the COVID-19 pandemic — emergency presentations to psychiatry and suicide deaths occur more frequently on school days compared to holidays and summer days.

"The association we found between increased risk of suicide in the 10-17 age group and school being in session has not changed significantly over the past 20 years. We need to keep this in mind as we reopen schools during the COVID-19 pandemic." —Dr. Tyler Black

By using the CDC WONDER database, all suicides according to month and day of the week were collected for the past 20 years and suicides occurring between the ages of 10-17 were isolated. Compared to non-school days, there was a 29-43 per cent increase in death by suicide in the 10-17 age group during school months. There was a 10-29 per cent increase in death by suicide in the same age group on weekdays compared to weekends. The researchers will next look at emergency presentations and suicides recorded at BC Children's Hospital using a more precise school calendar.

Technical Appendix

Methodology

Databases (LitCOVID, Medline, and Embase) were searched for peer reviewed published literature on the effects of school closures on children and families during COVID-19 and other pandemics over past 20 years, with a snowball search of relevant grey literature. This was completed on July 7, 2020, with additional relevant studies added to Aug. 10, 2020. Data from the COVID-19 Speak survey was analyzed by the BCCDC and the Office of the Provincial Health Officer Epidemiology team. BC Ministry of Health partners provided perspectives and data on food security, school connectedness and family violence. Researchers, clinicians and leaders at BC Children's Hospital of the Provincial Health Services Authority contributed information and data related to key areas of expertise and highlighted in progress studies to deepening our understanding of the progression and impacts of the COVID-19 pandemic on BC children and families.

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