

**COVID-19 in Children and Young People:
Literature Scanning Report 9
(11.12.20-1.1.21)**

Research question

What is the current knowledge about Covid-19 and children and young people?

Method

The search strategy and inclusion/exclusion criteria are outlined in the appendix on page 25. The titles and abstracts of 129 papers were screened against the agreed inclusion and exclusion criteria for possible inclusion in this report. This screening identified 73 papers for further consideration. The full text of each was assessed and 35 met the inclusion criteria. Details of the included and excluded studies are available on request. In this report, references that are highlighted in **red font** are pre-print publications. Papers that might be of particular interest and/or to raise awareness to the advisory group are highlighted in **purple font** and listed on page 2. Hyperlinks to the original articles are included whenever possible.

Key messages

- The evidence base about children and young people's role in the transmission of SARS-CoV-2 continues to develop. The available evidence from the European Union suggests that the return of children to school does not seem to be driving force behind the increase in cases which began to be seen in September and October. Schools across Europe had implemented a range of non-pharmaceutical interventions to limit the transmission of SARS-CoV-2 within school settings. It should be noted that this evidence does not take account of the 'UK' variant. No papers specifically addressing the new variant were identified.
- In the main, teachers and school staff do not seem to be at greater risk of COVID-19 infection than other key workers and occupational groups.
- The impact of the pandemic and the public health control measures on children and young people's physical and mental health continues to be a field of considerable research activity. However, the overall evidence base remains weak. In addition, many of the studies were carried out in the early stages of the pandemic so may not reflect the longer term effects as the pandemic continues and restrictions are lifted and, then, re-imposed.
- There is emerging evidence about the impact of the closures of schools and early learning and childcare settings on children's development. For example, early years providers in England highlighted their concerns about the effect of the restrictions on children's personal, social and

development after observing children's behaviour and skills on return to the early years setting.

- Likewise, primary and secondary school leaders felt that pupils' learning losses had been extensive. In primary schools, younger pupils were said to be more adversely affected. In some cases, pupils had regressed in their skills, for example, returning to school unable to hold a pencil when they had been able to do so previously. In both primary and secondary school, more undesirable behaviours were being seen.
- International and UK studies continue to suggest an intensification of child maltreatment linked to increased stress, loneliness and isolation and financial loss.
- A Scottish paper looking at the impact of COVID-19 on families, children and young people in South Lanarkshire highlights that the pandemic has exacerbated social and economic vulnerabilities of families, with those living in areas with the highest level of poverty most affected. It emphasises the increased isolation and reduced access services for those in rural areas, where areas of high poverty may be masked by current measurement approaches.

Reports of potential interest

Included in this paper

- [European Centre for Disease Prevention and Control. COVID-19 in children and the role of school settings in transmission - first update.](#) Stockholm: European Centre for Disease Prevention and Control; 2020.
- [Children's Task and Finish Group. Children's Task and Finish Group: update to 4th Nov 2020 paper on children, schools and transmission.](#) UK Government; 2020.
- [Gandini S, Rainisio M, Iannuzzo ML, Bellerba F, Cecconi F, Scorrano L. No evidence of association between schools and SARS-CoV-2 second wave in Italy. MedRxiv 2020. doi:10.1101/2020.12.16.20248134.](#)

Not included in this paper

The following studies and reports did not meet the inclusion criteria for this report. Nevertheless, they may be of interest to the advisory group.

Modelling studies

- [Agostinelli F, Doepke M, Sorrenti G, Zilibotti F. When the Great Equalizer Shuts Down: Schools, Peers, and Parents in Pandemic Times.](#) IZA 2020. Examined the effects of school closures during the Covid-19 pandemic on children's education. Using a structural model of skill formation looked the interaction of factors such as online education, peer effects and the response of parents that influence children's learning. School closures were found to have a large and persistent effect on educational outcomes that is unequal. High school students from poor neighbourhoods suffer a

learning loss of 0.4 standard deviations, whereas children from rich neighbourhoods remain unscathed.

- van Leeuwen E, Sandmann FG, Eggo RM, PHE Joint modelling group, White PJ. Time use and social mixing during and around festive periods: Potential changes in the age distribution of COVID-19 cases from increased intergenerational interactions. *MedRxiv 2020*. [doi:10.1101/2020.12.21.20248607](https://doi.org/10.1101/2020.12.21.20248607).

This study aimed to gain insights into possible changes in the age distribution of COVID-19 cases in the UK after temporarily increased intergenerational interactions in late December 2020. Changes in time use and social mixing based on age-stratified contact rates using historical nationally-representative surveys and up-to-date Google mobility data from four weeks before and after the festive period were modelled. The findings suggest that increased contacts during the festive period may shift the age distribution of COVID-19 cases from children towards adults.

- Zivelonghi A, Lai M. Minimizing cumulative risk to control airborne transmission of SARS-CoV2 in schools. *MedRxiv 2020*. [doi:10.1101/2020.12.19.20248493](https://doi.org/10.1101/2020.12.19.20248493).

Based on a mathematical model, the theoretical link between intervals of ventilation (natural or mechanical) and the lowering of aerosol contagion risk is explored.

Guidelines

- Centers for Disease Control and Prevention:
 - [Operating schools during COVID-19: CDC's Considerations](#)
 - [Guidance for Child Care Programs that Remain Open](#)
- WHO: [Checklist to support schools re-opening and preparation for COVID-19 resurgences or similar public health crises](#)

Findings

The included studies can be categorised into six broad topic areas:

- a) Transmission (n=13)
- b) Health and wellbeing (n=16)
- c) Child maltreatment (n=3)
- d) Healthcare (n=1)
- e) Learning during lockdown(n=1)
- f) Teacher wellbeing (n=1)

Transmission

Thirteen studies that examined aspects of the role of children and young people in the transmission of SARS-CoV-2 met the inclusion criteria for this paper. Six studies were reported in the supplementary paper of the 8th literature scanning report so are not included here. This current report includes one review of

international research, a report from the UK Government's Children's Task and Finish group as well as two related studies from Switzerland and three individual studies from Germany, Italy and America.

Review of international research

The European Centre for Disease Prevention and Control (ECDC) report provides an update on the role of children in the transmission of SARS-CoV-2 and the role of schools based on experience in the European Union (EU) from August to December 2020.¹ Evidence is drawn from case-based epidemiological surveillance analysis, literature review results from an EU survey sent to member states in November and the ECDC Response Measures database. Please note that this report does not take into account the new more transmissible 'UK-variant'.

The available evidence suggests that children returning to school from mid-August do not appear to have been the driving force behind the increase in cases seen in many EU Member states from October. In many countries, the re-opening of schools coincided with a relaxation of public health control measures and was followed by an increase in SARS-CoV-2 incidence across all age groups. Clusters of COVID-19 infection have been reported in pre-school, primary and secondary schools in numerous countries. However, where epidemiological investigation has been carried, transmission in schools account for a minority of all cases. In general, the prevalence of COVID-19 within a school is influenced by the community prevalence of the virus.

In the main, educational staff and adults in the school setting do not appear to be at a higher risk of infection than other occupational groups. However, those who are in contact with many older children and/or adults may be at increased risk. The available evidence suggests that a combination of physical distancing approaches that prevent crowding (e.g. class room distancing, staggered start times), especially in older age groups, along with hygiene and safety measures (e.g. handwashing, cleaning, ventilation) have a role in limiting the transmission of SARS-CoV-2 in educational settings.

School closures may help reduce SARS-CoV-2 transmission. However, assessing the relative effectiveness compared to other public health control measures is difficult. School closures are associated with significant adverse health, wellbeing and educational impacts in children. Children, families and communities living in difficult social circumstances are disproportionately affected. It is estimated that the economic costs of schools closures due to COVID-19 are high including direct learning lost, labour lost from working parents as well as longer term consequences such as lower skills in the labour force and less productivity.

Children's Task and Finish group

The publication from the UK Government is an update to a paper published at the beginning of November about children, schools and transmission.² Please note that this report does not take into account the new more transmissible 'UK-variant'. This paper was presented at SAGE 73 on the 17th December 2020.

New evidence and data included are updates on the prevalence of the virus from the ONS COVID-19 Infection Survey, updated analysis from the University of Manchester about children and household transmission, initial results from the COVID-19 Schools Infection Survey* and analysis of Department of Education data on COVID-19 cases in pupils and teachers from the University of Warwick. From the ONS COVID-19 Infection survey, there was no evidence that teachers/education workers were more likely to test positive for the virus compared to other key workers and other professions. The preliminary analysis from the University of Manchester found that children and young people (aged 2-16 years) are more likely than those aged 17+ years to be the first case in their household. The younger age group were more than twice as likely to pass on the virus in their household compared to the older group. The analysis of Department of Education data found that the percentage of pupils with the confirmed infection was greater among secondary school-aged children than primary school-aged children. However, the pattern of positive cases in teachers was different with similar numbers being seen across all settings.

Switzerland

Using a longitudinal cohort study, Ulyte et al examined changes in SARS-CoV-2 seroprevalence in school-aged children in Zurich.³ Classes within 55 participating schools were selected randomly, stratified by school level[†], to take part. The first round of testing took place in June-July (n=2603) and, again in October-November, with the same cohort of classes (n=2552). At the first round of testing, 74 children tested seropositive for SARS-CoV-2. Of these children, 42 were seropositive and 28 were negative at the second testing time. Four children were not re-tested. At the second testing point, a total of 173 were seropositive including the 42 children who had previously tested positive, 109 who had previously tested negative and 22 children who had not been tested during the first round of testing. The overall estimated SARS-CoV-2 prevalence among children taking part at the first testing point in the summer was 2.4% which rose to 4.5% in the autumn. No significant differences in SARS-CoV-2 seroprevalence among children in different school levels was found. From August, all schools were obliged to implement preventative infection control measures[‡] to mitigate

* Included in the 8th supplementary report

[†] Grades 1-2 (6-9 years), Grades 4-5 (9-13 years), Grades 7-8 (12-16 years)

[‡] e.g., masks for teachers and children >12-years-old, distancing rules in class- and teachers' rooms, tapering of school breaks, no mixing of classes, ban of group gatherings such as excursions and camps beyond class units, no parents on school grounds

transmission of the virus but the details varied between schools. At the beginning of November, the incidence of SARS-CoV-2 in the Zurich region was 59 daily cases per 100,000 population with a RT-PCR positivity of approximately 16%.

In a nested study, Kriemler et al piloted a surveillance system to detect acute SARS-CoV-2 infections in schools.⁴ A sub-sample (n=15) of the schools taking part in the study by Ulyte et al were invited to take part in early December; fourteen schools agreed. In each school, two buccal swabs were collected from children taking part in the cohort study and teachers on two days, one week apart. One swab was tested for SARS-CoV-2 using a Rapid Diagnostic Test and the other with a PCR. Across the two testing visits, one child had a positive PCR test and none of the teachers tested positive on PCR testing. The positive PCR test was detected at the first testing point. The same child tested negative using the Rapid Diagnostic Test at the same time point. Both tests were negative at the second testing time. Across the two testing points, there seven positive Rapid Diagnostic Tests among children and two among teachers; all were negative on PCR testing.

Germany

Students and teachers attending 24 schools (12 primary and 12 secondary level) in Berlin were invited to take part in study examining the prevalence of current SARS-CoV-2 infection and SARS-CoV-2 seroprevalence as well as asking questions about personal and school-level infection control measures.⁵ In total, 535 children and adults took part including 193 primary pupils, 192 secondary pupils and 150 teachers. Swabs for RT-PCR were collected from 532 participants; one secondary school pupil tested positive. Capillary blood for anti-SARS-CoV-2 IgG was taken from 527 participants; seven pupils tested positive. Schools had a number of infection prevention control measures* in place to mitigate the transmission of the virus. At the time of this study (June), the community prevalence of the virus was reportedly low.

Italy

Using a retrospective analysis of routine collected information, Gandini et al investigated the overall incidence of SARS-CoV-2 among students and teachers and examined if there was an association between school openings and increased infections.⁶ It was found that, overall, the incidence among school-aged children was lower than in the general population, although regional differences were observed among high schools. In three regions, the incidence among high school pupils was higher than the general population. Among teachers and non-teaching school staff, the incidence was found to be higher than the general population. Between 25th November and 21st December,

* e.g. hand hygiene, physical distancing, wearing face masks, or self-isolation, and testing of symptomatic students and staff.

contact tracing was carried out for 380 student, 30 non-teaching school staff and 114 teacher index cases in 339 schools in the Veneto region. 76 secondary cases were identified. The frequency of secondary cases was higher among pupils than teachers or non-teaching school staff. A secondary case among teachers was more frequent when the index case was a teacher than when it was a pupil. Secondary cases among non-teaching school staff were due to contact with index cases among other staff members. No association between school re-opening and increasing infections was found. Infection prevention measures* were in place in schools to mitigate the transmission of SARS-CoV-2.

America

Fricchione et al reports cases of SARS-CoV-2 associated with Archdiocese Catholic Schools[†] in Chicago in the weeks after the re-opening of schools in August 2020 up to the beginning of October.⁷ At the time, mitigation measures to control the spread of SARS-CoV-2 within the schools were in place.[‡] School-associated cases were defined staff members or students with confirmed or probable COVID-19 and had been in school during the infectious phase or had been in school within fourteen days of an infectious case. During the study period, 31 schools reported 59 cases (20 staff members[§] and 39 students^{**}) of COVID-19; 47 cases (fourteen staff and 33 students) were considered by local public health department to be associated with the school. Of these, three clusters were identified; two clusters involved staff members only and one involved a student and a staff member. Two clusters were associated with non-adherence to physical distancing outside of class time. However, in one cluster, classroom transmission could not be ruled out. At the time of this study, the average 7-day rolling average incident case count was 316 (250-358; equivalent to 9.3-13.3 daily infections per 100 000 population) and the average test positivity was 4.8% (4.1%-5.3%).

¹ [European Centre for Disease Prevention and Control. COVID-19 in children and the role of school settings in transmission - first update.](#) Stockholm: European Centre for Disease Prevention and Control; 2020.

² [Children's Task and Finish Group. Children's Task and Finish Group: update to 4th Nov 2020 paper on children, schools and transmission.](#) UK Government; 2020.

* E.g. temperature control and hand hygiene at the school entrance; unidirectional flows of students; mask mandate for all personnel and students in common areas and for high school students also when seated at their desks (and always for teachers, combined with face-shields in certain settings), compulsory 1m seat to seat distance, frequent classroom natural ventilation, ban on school sports and music, reduced duration of school hours and reduced school duration

[†] Largest private school system in America

[‡] Including mandatory masking, physical distancing, daily on-site temperature and symptom checks, access to hand hygiene supplies in every room, and quarantining of an entire cohort whenever a positive individual was identified within that cohort.

[§] Out of an estimated staff population of 2,750

^{**} Out of an estimated student population of 19,500

³ Ulyte A, Radtke T, Abela IA, Haile SR, Berger C, Huber M, et al. Clustering and longitudinal change in SARS-CoV-2 seroprevalence in school-children: prospective cohort study of 55 schools in Switzerland. *MedRxiv 2020*. doi:[10.1101/2020.12.19.20248513](https://doi.org/10.1101/2020.12.19.20248513).

⁴ Kriemler S, Ulyte A, Ammann P, Peralta GP, Berger C, Puhan MA, et al. Surveillance of acute SARS-CoV-2 infections in school children and point-prevalence during a time of high community transmission in Switzerland. *MedRxiv 2020*. doi:[10.1101/2020.12.24.20248558](https://doi.org/10.1101/2020.12.24.20248558).

⁵ Hommes F, Loon W van, Thielecke M, Abramovich I, Lieber S, Hammerich R, et al. SARS-CoV-2 infection, risk perception, behaviour, and preventive measures at schools in Berlin, Germany, during the early post-lockdown phase: A cross-sectional study. *MedRxiv 2020*. doi:[10.1101/2020.12.18.20248398](https://doi.org/10.1101/2020.12.18.20248398).

⁶ Gandini S, Rainisio M, Iannuzzo ML, Bellerba F, Cecconi F, Scorrano L. No evidence of association between schools and SARS-CoV-2 second wave in Italy. *MedRxiv 2020*. doi:[10.1101/2020.12.16.20248134](https://doi.org/10.1101/2020.12.16.20248134).

⁷ Fricchione MJ, Seo JY, Arwady MA. Data-driven Reopening of Urban Public Education through Chicago's Tracking of COVID-19 School Transmission. *J Public Health Manag Pract 2020*; Published Ahead of Print. doi:[10.1097/PHH.0000000000001334](https://doi.org/10.1097/PHH.0000000000001334).

Health and wellbeing

There were sixteen reports that examined aspects of children and young people's health and wellbeing that met the inclusion criteria for this report. Five reports focus on elements of mental health, six explore learning, development and wellbeing, three look at physical health and two centre on aspects of family wellbeing. These studies contribute to emerging evidence that children and young people's health and wellbeing has been adversely affected by the pandemic and the necessary public health control measures. However, most rely on cross-sectional designs with recruitment processes that introduce a source of bias. Often, it is not possible to tell how representative the participants are of a general population. Thus, the findings in the following section should be interpreted with a degree of caution.

Mental health and wellbeing

One review of international studies and five individual studies from America, France, Italy, Italy/Spain/Portugal and the Netherlands were included.

International review

The aim of the systematic review by Panda et al was to collate reports that described the likely effects of the COVID-19 pandemic and quarantine measures on children and adolescent's mental health and wellbeing.⁸ Fifteen studies met the inclusion criteria for this review; ten were assessed by the authors as being of fair quality and five as good quality. Overall, using pooled estimates from the included studies the authors found that a proportion of children were reported to be showing symptoms of anxiety (34.5%), depression (41.7%), irritability (42.3%) and inattention (30.8%). In addition, children were reported to be bored (35.2%) and have sleep disturbances (21.3%).

There is, however, no differentiation between different age groups in the analysis. The primary studies were cross-sectional, conducted across eleven countries where the experiences of children are likely to differ depending on the stage of the pandemic and the restrictions in place at the time of the study. It is difficult to judge the validity of the authors' findings as the details of the included studies are limited and the synthesis of the findings is restricted to summarising each study individually. In addition, there are inconsistencies in the stated methodology. For example, the search strategy was reported to include pre-print servers, even though the stated exclusion criteria specifically excluded non-peer reviewed papers.

America

Using a cross-sectional survey, Murata et al aimed to examine the impact of the pandemic on the mental health of adolescents and adults over the age of thirteen years.⁹ Participants were recruited through advertisements on social media; 583 of respondents were adolescents* (about 12% of the total). Respondents were asked bespoke questions about their exposure and experiences of COVID-19, their social distancing behaviours as well as standardised questionnaires to measure symptoms of depression, anxiety, lifetime suicidal ideation and behaviour.

Compared to adult participants, adolescents were more likely to report clinically significant depression, anxiety, suicidal ideation or behaviour, perceived stress and sleep problems. Loneliness was a common predictor across all the psychiatric outcomes. In adolescents, lower perceived social status, higher perceived stress, suspected exposure to COVID-19 and lower ratings of overall health predicted higher levels of anxiety symptoms. Higher number of hours per day spent on social media predicted depression symptoms and a higher number of hours of exposure to media about COVID-19 predicted suicidal ideation or behaviour.

France

In a retrospective analysis of routinely collected information, Mourouyaye et al examined the association between admissions for suicidal behaviours in a paediatric hospital during the first national COVID-19 lockdown.¹⁰ The number of children (aged 7-17 years) admitted to the hospital for suicidal behaviour was compared between 'before and after lockdown' (1st January 2018 – 15th March 2020 and 11th May to 1st June 2020) and 'during lockdown' (16th March – 10th May 2020). In total, over the full study period, 234 children were admitted. The average numbers of admissions per week was 1.25 (SD 1.28) during the lockdown period compared to 2.5 (SD 1.7) at the other times. A significant association between lockdown and the average admissions for suicidal behaviour

* Only information related to adolescents was extracted

was found. In this short report, there are limited data tables presented so it is difficult to judge the validity of the authors' findings.

Italy, Spain and Portugal

Using a survey questionnaire, Francisco et al aimed to assess psychological wellbeing and behavioural changes among children and adolescents during the early stages of pandemic in three countries.¹¹ At the time of this study, Italy and Spain had mandatory quarantine/home confinement orders in place, whereas in Portugal quarantine/home confinement was voluntary. Recruitment was through social media and the networks of the researchers. Participants were asked to complete a bespoke questionnaire about feelings of anxiety, their mood, sleep patterns, behavioural and cognitive changes.

Parents of 1,480 children and adolescents (3-18 years) across the three countries took part. Approximately a third of children were reported be restless (n=563, 38%), nervous (n=543, 36.7%), worried (n=495, 33.4%), uneasy (n=563, 38%) and anxious (n=446, 30.1%). More than half (n=772, 52.2%) were reported to be bored and about a third lonely (n=491, 33.2%). Four-in-ten of parents (n=598, 40.4%) reported that their child was irritable and about a third (n=447, n=30.2%) said that their child was arguing more with the rest of the family. Parents reported marked increases in their child's daily use of screens while the amount of daily physical activity decreased.

Children who did not have access to an outdoor space at home (garden or terrace) were found to be significantly more likely to have parent-reported anxiety as well as changes to their sleep and behaviour. Having fewer people at home was found to be associated with more reported changes in mood. After controlling for the child's age, the presence of outdoor space and the number of people at home remained significant predictors of symptomatology. Age and sex were also found to be significant predictors of children's parent-reported symptoms. Being male predicted behavioural changes and anxiety while being younger predicted changes in behaviour and sleep. This study, however, relies on parent recall and report using a non-validated questionnaire which introduces a potential source of bias.

Netherlands

Zijlmans et al* examined the mental health of children and young people during the first national lockdown in the Netherlands[†].¹² Parents of children (8-18 years) in three population groups were recruited by email. A 'psychiatric' sample was

* Same study as *Luijten MAJ, van Muilekom MM, Teela L, van Oers HA, Terwee CB, Zijlmans J, et al. The impact of lockdown during the COVID-19 pandemic on mental and social health of children and adolescents. MedRxiv 2020. doi:10.1101/2020.11.02.20224667* which was included in 6th Report but reports different aspects.

† Carried out end of April – early May 2020

recruited from children receiving treatment at a tertiary child and adolescent psychiatric centre, a 'paediatric' sample was recruited from children with a chronic medical condition that attended a children's hospital and a 'general' population sample was recruited through an online research agency. Parents were asked questions related to COVID-19 as well as sociodemographic questions. Children were asked questions about their global health, peer relationships, anxiety, depressive symptoms, anger and sleep-related impairment.

Overall, information was received from 1,183 respondents; 249 from the psychiatric sample (4.4% response), 90 from the paediatric sample (7.1% response) and 844 in the general sample.* Overall, on all measures except for global health, children in the paediatric sample reported the least problems, whereas children in the psychiatric sample reported significantly more problems than the general population in all measures apart from anxiety and peer relationships. Differences in age and gender were observed with being older significantly associated with lower global health, higher anxiety and lower anger scores. Male gender was linked with higher global health, lower peer relationships, lower depressive symptoms and lower sleep-impairment scores. Being from a single-parent family was found to be significantly associated with lower global health and higher anxiety scores. Having three children or more in the household was linked with higher anger scores. A negative change in the parental work situations was significantly associated with more anxiety and depressive symptom and sleep-related impairment scores. While all parents reported a deterioration in the atmosphere at home, only children in the general population did so.

The response rates in this study were very low so it is possible that those responding may have differed in fundamental ways. As this study does not compare mental health during lockdown with beforehand, it is not possible to tell if the differences between the three populations are a result of a differential impact of the restrictions.

Learning, development and wellbeing

Six reports that examined aspects of children's learning, development and wellbeing during the pandemic met the inclusion criteria for this paper. The majority of the reports are from the UK; two reports from OFSTED in England, two from Scotland and one UK-wide report from the NSPCC. The final study was carried out in Canada.

England

The final OFSTED briefing report about early years presents the findings from 739 interviews carried out with early years providers from October to December

* Parents were invited until 1000 responses were received

2020.¹³ Participants reported that children's abilities to settle back into the early childcare setting depended on the experiences they had had at home during the time schools and nurseries were largely closed. Children who had had positive experiences during the first national lockdown were reported to have settled relatively quickly back into the childcare setting. Providers reported that children who had experienced challenging family circumstances needed more reassurance to readjust to the routines and structure of the setting. They remained concerned about the impact of the restrictions had had on children's personal, social and emotional development. Providers reported that many children had needed help with their behaviour on their return to the setting, in particular with understanding the rules, sharing and playing nicely together. Some children had appeared angry, with an increase in shouting, snatching and getting cross if things didn't go their way. Sitting still, maintaining attention and engaging in activities seemed to be more difficult for some children. Some providers thought that children were less inquisitive, curious and less likely to ask as many questions. Some children had mastered new skills but had missed other key aspects of development.

Almost a third of providers (31%) who reported having referred a child or family to an external agency felt that more children needed help from external sources compared to the previous year. Some providers said that they had made more referrals to social services for neglect and an increase in domestic violence in the home. Children that were affected were said to have regressed emotionally and some had displayed challenging behaviours on their return to the setting. Providers were concerned about the impact of the pandemic on managers' and staff's well-being. In addition, they were worried about risks of the virus to their own families, particularly those with vulnerable household members. There is, however, no information given in this report about the recruitment process or analysis approach. It is difficult to judge the validity of the findings as there are no supporting quotations in this report.

The second OFSTED briefing presents analysis of information gathered from 297 interim visits to primary and secondary schools in England in November 2020.¹⁴ Many leaders in both primary and secondary schools reported that learning losses had been extensive. In primary schools, it was felt that pupils had returned to school at a similar level as they had been at before school closures in March. Pupils were thought to be 'well below' where they should have been. Younger pupils were said to have been more adversely affected with a negative impact on social and communication skills, listening skills, speech, phonic knowledge as well as fine and gross motor skills. For example, some pupils had returned to school unable to hold a pencil when they could do so before. Losses in learning in mathematics and literacy were particular areas of concern for primary school leaders.

Many secondary school leaders felt that pupils in all year groups had fallen behind in a range of subjects. Particular concerns were raised about mathematical knowledge and related skills as well as literacy. School leaders raised particular concerns about pupils in Year 7 who had not experienced the 'normal' transition arrangements from primary-level schools and those in Year 11. Similarly, the progress of pupils who had English as an additional language were of great concern where English was not spoken at home.

Children were reported to have returned to school ready and keen to learn. However, many primary school leaders reported seeing more undesirable behaviours. Some children were reported to struggle with their social skills, for example having difficulties co-operating with others. A few leaders said that the personal and social development of pupils was behind what they would expect. Likewise some secondary school leaders reported an increase in extreme poor behaviour such as aggression and fighting between pupils. Anxiety had emerged as another challenge. Several leaders reported an increase in children with eating disorders and higher numbers of pupils self-harming. Many leaders reported that they had not seen many cases of newly vulnerable children or new safeguarding cases. However, they had noticed that pre-existing cases had deteriorated during the lockdown, with increases in domestic violence and/or parental substance misuse.

The bubble structure in secondary schools was reported to be causing physical fatigue for some teachers, as staff were moving from classroom to classroom. The bubble structure was also adding to social isolation of staff. Many school leaders talked about struggling with the amount of workload in a 'constantly fluid' situation, constant vigilance and responding to situations on a daily basis. These included positive COVID-19 tests for pupils and staff, tracking close contacts of positive cases, the ongoing pressure of keeping everyone safe and keeping guidance from the Department of Education.

Schools that had been previously assessed as 'inadequate' were over-represented and schools previously assessed as 'good' were under-represented in this sample. The understandings and experiences of the school leaders about how children have been affected may not be representative of the wider population. No information is given about the analysis approach and it is difficult to judge the validity of the findings as there are no supporting quotations in this report.

Scotland

In a mixed case study, Bynner et al carried out qualitative interviews with service providers working in areas of high poverty in South Lanarkshire to explore the experiences of families, children and young people during the pandemic.¹⁵ Ten service providers working across a range of services were recruited through the stakeholders of Children's Neighbourhoods Scotland.

Interviewees described families that had been previously just coping as struggling to afford basic necessities at the same time as dealing with the uncertainty of unemployment and furlough. Several interviewees suggested that the pandemic had exacerbated the sense of isolation that was already felt by people living in rural areas. Geographical isolation was felt to pose challenges, particularly when bus services had been reduced during the lockdown. The nature of small villages where 'everyone knows everyone' was felt to heighten the potential for people to feel judged for accepting support.

Digital exclusion was identified as the biggest challenge facing families by a number of interviewees. The experience of remote learning had been variable; many schools had made considerable efforts to provide interactive and creative learning at home. However, in other cases, communication from schools to parents had been inconsistent. Interviewees reported that families' experiences of lockdown had varied. Some families had benefited from the slower pace of life and the ability to spend time together. On the other hand, the closure of schools had been particularly difficult for families who relied on the sense of community and support that the school provided. The lack of routine was reported to have resulted in some young children becoming more subdued, where others had exhibited challenging behaviours that parents struggled to manage. It is not known, however, if these perspectives of service providers directly reflect the experiences of children and families living in the area.

The second Scottish report presents the findings of Lockdown Lowdown survey undertaken by the Scottish Youth Parliament to find out how the pandemic is impacting on young people (11-26 years) in Scotland.¹⁶ This follow up* survey focuses on the concerns of young people as the restrictions were lifted. Respondents (n=6,043) were asked several open-ended questions about the perceived impact of COVID-19 on their education, relationship, employment, mental and physical health as well as access to information.

About two-thirds (67%) of those that had returned to in-person learning agreed or strongly agreed that they were happy to be back. A similar proportion (63%) thought that their establishment had re-opened in a safe way. The majority of respondents who were in part-time employment had seen their working arrangements change with 41% experiencing a reduction in hours and 38% stating that they had been furloughed. Of young people who were in fulltime employment, 38% said they had been furloughed and around a fifth (22%) had experienced a reduction in hours. Almost two-fifths of respondents who were in employment (part- or full-time) disagreed or strongly disagreed that they felt good about their future employment prospects.

* Carried out 28th September – 2nd November

The majority (60%) agreed of respondents strongly agreed that they felt good about their physical health and wellbeing. They had more mixed views about their mental health with similar numbers agreeing (42%) and disagreeing (38%) that they felt good about their mental health and wellbeing. Young people said that felt most confident about accessing information or advice about current COVID-19 restrictions. They felt least confident about accessing information about available financial support. The majority of respondents (97%) stated they had access to a device with reliable broadband or data. The information in this report, however, is not differentiated by age group; the majority of respondents (79%) were younger than 18 years. It is probable that the experiences and understandings of respondents at the lower end of the age range (11 years) will have been different from those at the upper end (26 years).

United Kingdom

Using insights from Childline counselling sessions and message boards from the beginning of April to the end of October 2020, the briefing from the NSPCC aims to heighten the experiences of children and young people of being away from and returning to school during the pandemic.¹⁷

Children talked about missing the social interaction, support and security that school offered. Learning during lockdown had been a challenge for some children as they had struggled to adapt to new routines. Some children were concerned about falling behind in their school work. Others had found it hard to take part in online lessons as it had brought back distressing memories of online abuse. As restrictions were lifted, some children were looking forward to going back to school, catching up with work and getting back into a routine. Others found that school was a very different place with COVID secure measures in place, and they found it difficult to adjust. Some children expressed frustrations with peers that they did not think were following the social distancing measures.

For some children, school closures had provided respite from being bullied and they worried about what might happen when they returned to school. Other children had experienced online bullying by people they considered friends during lockdown and they worried what would happen when they met face-to-face. For children who did not feel safe at home, going back to school was a chance to get support from trusted adults. Some children with pre-existing mental health issues had struggled during lockdown. While some thought that returning to school would improve things, others going back to school had been a trigger to start self-harming again or having suicidal thoughts or feelings. These insights, however, are drawn from children and young people who have contacted Childline for support. Their understandings and experiences may not be representative of the wider population.

Canada

Parents of children (aged 4-5 years) enrolled in a public kindergarten programme were invited to take part in a longitudinal research project that examined the impact of parental engagement on child development.¹⁸ Baseline data was collected between December 2019 and January 2020 and, again, when schools were closed during May and June 2020. Parents were asked to complete a survey which included standardised questionnaires to measure parents' beliefs about involvement in their child's education, their involvement in their child's education and to rate their child's ADHD symptom levels. This report presents information from respondents who reported inattention and hyperactivity/impulsivity scores at both time points (n=113).

Overall, children's ADHD symptom levels were rated higher by their parents at the second data collection point than at baseline. ADHD symptoms were found to be negatively associated with parents' perceptions of their knowledge and skills to support their child's education. In general, there were no differences in parental involvement beliefs and behaviours at the two time points. However, changes in parental beliefs that supporting their child's education was part of their responsibility were identified. For boys, parents reported an increase in believing that it was part of their responsibility, whereas for girls parents reported a decrease.

There is information missing from this report. For example, the response rate is not described. The invitation to take part was sent to parents in 32 kindergarten classes in six schools. In this sample, the majority of families spoke English at home (90%) and parents were educated to degree level (82%). The median household income of those taking part was greater than the regional median.

Physical health

Three studies from Italy (n=1) and Canada (n=2) that examined aspects of children and young people's physical health met the inclusion criteria for this paper.

Italy

Parents of children (less than 18 years) were recruited, through posters displayed in a tertiary paediatric hospital and paediatricians' waiting rooms as well as through social media, to take part in a survey that aimed to investigate the effects of lockdown on food insecurity and changes in children's eating habits.¹⁹ An adapted version of the 'Hunger Vital Sign' questionnaire was used to ask questions about food insecurity along with bespoke questions about changes in children's eating habits, in particular about their intake of snacks, sweetened fruit juices and soft drinks.

Complete responses were received from 5,811 parents. About one in ten parents (10.6%, n=616) reported that that they worried more about getting adequate

food for their family compared to before the pandemic, while 1.5% (n=88) said they were less concerned. Families with more than one child, with at least one parent on furlough or when the parent considered that their income was at risk were at higher risk of becoming food insecure. Children's food intake was reported to have changed by 40.2% of respondents with 27.3% (n=1,588) saying that their child was eating more food, eating more snacks (n=958, 16.5%), drinking more fruit juices (n=223, 3.8%) and soft drinks (n=165, 2.8%). Increased food intake was found to be associated with having a precarious financial situation, having more than one child, having children older than two years and children missing outdoor activities. Children's mood changes as perceived by parents were found to be associated with a change in children's food intake. In this study, more than 90% of the sample described their financial situation as 'well off' or 'satisfactory'.

Canada

The first study from Canada examined parental anxiety and perceptions of their child's physical activity and sedentary behaviour during the pandemic.²⁰ Part of a larger research project, parents of school-aged children (5-17 years) were recruited through postcards sent to a random sample of households across fourteen neighbouring communities. Participants were asked about their level of anxiety in relation to the pandemic, changes to their child's indoor and outdoor physical activity and sedentary behaviour as well as time spent playing in parks and public spaces. Of 1,124 respondents (response rate \approx 5%), complete information was received from 328 parents with at least one school aged child.

About a third of parents (35.7%) reported that they were extremely or very anxious about COVID-19. The majority of parents reported that their child's physical activity at home had either increased (48.8%) or remained the same (32.9%) since the pandemic. Outdoor physical activity was said to have increased (38.7%), decreased (39%) or stayed the same. About half of parents reported that their child's play at a park (52.7%) or in public spaces (53.7%) had decreased. Children's sedentary behaviours were reported to have increased including more time spent watching television (58.8%), playing video games (56.4%) and using screen-based devices (75.9%). Parents who reported high levels of anxiety related to the pandemic were more likely to say that their child's physical activity had decreased at home, had fewer park visits in the previous month and that sedentary behaviours had increased compared to parents with low levels of anxiety. In this study, 58.2% of the sample reported that they were educated to at least degree level.

The second Canadian study explored factors that influenced young people's (14-22 years) perceptions of risk from COVID-19 and their adherence to public health control measures.²¹ Young people were recruited through schools and community partners as well as social media and newspapers. Participants (n=3,337) were asked about knowledge of COVID-19, the perceived risk of

infection for themselves and for their families/friends as well as their adherence to measures recommended to limit the spread of the virus.

The majority of respondents (90%) considered themselves well-informed and reported higher use of reliable sources of information such as government press conferences and websites and lower use of social media for information. Overall, young people who reported they had a chronic disease demonstrated greater knowledge about COVID-19 and perceived a higher risk of infection than their healthy peers. Greater knowledge about COVID-19, presence of chronic disease and use of immunosuppressants were found to be associated with a high perception of risk of infection. More than half of the respondents (n=1823, 60%) reported that they were adhering to the main four measures* recommended to limit the spread of the virus. Being female and having a higher perception of risk of infection was found to be associated with a higher odds of adherence to the measures.

This study, however, was carried out early in the pandemic (April 2020) and may not be representative of current perspectives. It is possible that young people answered questions about adherence to the public health measures in ways that were thought to be socially desirable.

Family wellbeing

Two studies, from America (n=1) and Italy (n=1), examined aspects of family wellbeing during the pandemic.

America

Chu et al used a mixed method study to understand the impacts of the pandemic on families.²² Parents with at least one child (6-17 years) were recruited to take part in an online survey (n=324). This report presents the findings from a subset of parents (n=56) and children (n=43) who took part, in April and May 2020, and completed a writing prompt task, which asked participants to write about their 'deepest thoughts and feelings' about COVID-19 for five minutes. Parents were asked to complete the Positive and Negative Affect Scale immediately before and after undertaking the written task.

From the parents' written reports, twelve themes were identified that captured their positive and negative feelings about the pandemic; nine themes described negative perspectives. Parents expressed concerns about the impact of COVID-19 on their children (particularly their social development), health concerns for others (particularly elderly family members), and talked about the stressful balancing act of parenting, assisting with children's school work, and working from home. Many parents reported gratitude for what they had, and reflected on

* Washing their hands, avoiding group gatherings, reducing unnecessary use of public transport and avoiding public places

the upsides of the pandemic for family relationships and parent-child bonding. From children's written reports, nine themes were identified that described their positive and negative feelings about the pandemic. Children wrote about yearning to return to school, pandemic-related fears and difficulties, and longing for social connection.

There is limited information given in this report which makes judging the validity of the findings difficult. For example, there are no quotations presented to support the identified themes. The sample was drawn from a mainly White (non-Hispanic) population of well-educated mothers who were living in dual-income households. Although it is not stated in the methods, the writing task occurred at the end of survey questionnaire that included quantitative measures about anxiety, parenting stress and COVID-19, so it is possible parents taking part may have been prompted to write more on these topics.

Italy

In Italy, Bentenuto et al investigated the psychological impact of the pandemic on families with children with neurodevelopmental disorders.²³ Participants were recruited through social media, networks and snowballing as part of a larger research project. They were asked to complete an online survey which contained a mix of validated questionnaires and bespoke questions. Participants were asked to the validated questionnaires twice; first with reference to their current situation and secondly to the month before lockdown. Information from respondents that reported that they had a child with a neurodevelopmental disability (n=82) were matched with parents with a typically developing child (n=82).

Overall, both groups of parents reported greater parental stress during lockdown compared to previously. Parents with children with a neurodevelopmental disability reported more parental stress than parents with a typically developing child both during and before the lockdown. In both groups, parents reported more child externalising behaviours during lockdown. Children's externalising behaviours were found to be the main predictor of parental stress. In this study, the reliance on parental recall for the 'before lockdown' comparative information which introduces a source of potential bias. There are limited data tables presented in this report so it is difficult to assess the validity of the authors' findings.

⁸ Panda PK, Gupta J, Chowdhury SR, Kumar R, Meena AK, Madaan P, et al. Psychological and Behavioral Impact of Lockdown and Quarantine Measures for COVID-19 Pandemic on Children, Adolescents and Caregivers: A Systematic Review and Meta-Analysis. *J Trop Pediatr* 2020. [doi:10.1093/tropej/fmaa122](https://doi.org/10.1093/tropej/fmaa122).

⁹ Murata S, Rezeppa T, Thoma B, Marengo L, Krancevich K, Chiyka E, et al. The psychiatric sequelae of the COVID-19 pandemic in adolescents, adults, and health care workers. *Depress Anxiety* 2020. [doi:10.1002/da.23120](https://doi.org/10.1002/da.23120).

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- ¹⁰ Mourouvaye M, Bottemanne H, Bonny G, Fourcade L, Angoulvant F, Cohen JF, et al. Association between suicide behaviours in children and adolescents and the COVID-19 lockdown in Paris, France: a retrospective observational study. *Arch Dis Child* 2020. [Doi:10.1136/archdischild-2020-320628](https://doi.org/10.1136/archdischild-2020-320628).
- ¹¹ Francisco R, Pedro M, Delvecchio E, Espada JP, Morales A, Mazzeschi C, et al. Psychological Symptoms and Behavioral Changes in Children and Adolescents During the Early Phase of COVID-19 Quarantine in Three European Countries. *Front Psychiatry* 2020;11:570164. [doi:10.3389/fpsy.2020.570164](https://doi.org/10.3389/fpsy.2020.570164).
- ¹² Zijlmans J, Teela L, Ewijk H van, Klip H, Mheen M van der, Ruisch H, et al. Mental and social health of children and adolescents with pre-existing mental or somatic problems during the COVID-19 pandemic lockdown. *MedRxiv* 2020. [doi:10.1101/2020.12.15.20248237](https://doi.org/10.1101/2020.12.15.20248237).
- ¹³ OFSTED. [COVID-19 series: briefing on early years](#), November 2020. Manchester: OFSTED; 2020.
- ¹⁴ OFSTED. [COVID-19 series: briefing on schools: November 2020](#). Manchester: OFSTED; 2020.
- ¹⁵ Bynner C, McBride M, Weakley S, Ward S, McLean J. [The impact of COVID -19 on families, children and young people in South Lanarkshire](#). Glasgow: Children's Neighbourhoods Scotland; 2020.
- ¹⁶ Scottish Youth Parliament, Youth Link Scotland, Young Scot. [Lockdown Lowdown: Survey of over 6,000 young people from across Scotland](#). Youth Link Scotland; 2020.
- ¹⁷ NSPCC. [The impact of the coronavirus pandemic on child welfare: schools](#). NSPCC Learning; 2020.
- ¹⁸ Wendel M, Ritchie T, Rogers MA, Ogg JA, Santuzzi AM, Shelleby EC, et al. The Association between Child ADHD Symptoms and Changes in Parental Involvement in Kindergarten Children's learning During COVID-19. *School Psych Rev* 2020; 49:466–79. [doi:10.1080/2372966X.2020.1838233](https://doi.org/10.1080/2372966X.2020.1838233).
- ¹⁹ Dondi A, Candela E, Morigi F, Lenzi J, Pierantoni L, Lanari M. Parents' Perception of Food Insecurity and of Its Effects on Their Children in Italy Six Months after the COVID-19 Pandemic Outbreak. *Nutrients* 2020; 13. [doi: 10.3390/nu13010121](https://doi.org/10.3390/nu13010121).
- ²⁰ McCormack GR, Doyle-Baker PK, Petersen JA, Ghoneim D. Parent anxiety and perceptions of their child's physical activity and sedentary behaviour during the COVID-19 pandemic in Canada. *Prev Med Rep* 2020:101275. [doi:10.1016/j.pmedr.2020.101275](https://doi.org/10.1016/j.pmedr.2020.101275).
- ²¹ Yang XY, Gong RN, Sassine S, Morsa M, Tchogna AS, Drouin O, et al. Risk Perception of COVID-19 Infection and Adherence to Preventive Measures among Adolescents and Young Adults. *Children (Basel)* 2020; 7. [Doi: 10.3390/children7120311](https://doi.org/10.3390/children7120311).
- ²² Chu KA, Schwartz C, Towner E, Kasparian N, Callaghan B. Parenting under Pressure: A Mixed-Methods Investigation of the Impact of COVID-19 on Family Life. *SSRN Journal* 2020. [doi:10.2139/ssrn.3741254](https://doi.org/10.2139/ssrn.3741254).
- ²³ Bentenuto A, Mazzoni N, Giannotti M, Venuti P, de Falco S. Psychological impact of Covid-19 pandemic in Italian families of children with neurodevelopmental disorders. *Res Dev Disabil* 2020; 109:103840. [doi:10.1016/j.ridd.2020.103840](https://doi.org/10.1016/j.ridd.2020.103840).

Child maltreatment

Three studies from America that looked at aspects of child maltreatment met the inclusion criteria for this report.

In the first study, Swedo et al analysed data collected by the National Syndromic Surveillance Program (NSSP)* about weekly numbers of emergency department visits related to child abuse and neglect from the beginning of January 2019 until the beginning of September 2020.²⁴ In 2020, across all age groups of children, the total number of emergency department visits related to child abuse and neglect started to fall, in the middle of March (week 11), below the number of visits that occurred in same time period in 2019. During the four weeks 29th March to 25th April, the number of visits related to child abuse and neglect was on average 53% less than in the same time period in 2019. However, at the same time, while the absolute numbers fell, the proportion of emergency visits that were related to child abuse and neglect increased above the 2019 levels. The number of the visits that resulted in hospitalisation did not fall in 2020. The percentage of emergency department visits related to child abuse and neglect that resulted in hospitalisation increased significantly across all age groups.

In the second study, parents were recruited, through a survey research company, to examine if parent reported difficulties in parenting due to social isolation at the beginning of the pandemic[†] was associated with risk of child maltreatment.²⁵ A mix of standardised and bespoke questions were used to assess risk for physical and emotional neglect, verbal aggression and physical abuse as well as changes in parenting behaviours over the previous two weeks. This report presents findings from 283 respondents who were living at home with a child (0-12 years).

Parental perceived social isolation[‡] was found to be linked to the risk of physical and emotional neglect as well as verbal aggression towards their child. The associations remained after potential confounders such as income level, employment status and depression were taken into account. In addition, higher levels of perceived social isolation was found to associated with increased odds of parents reporting that, in the previous two weeks, they had disciplined their child more, yelled or screamed at their child more, had more conflicts with their child, left their child at home more and had spanked or hit their child more. Having experienced a change in employment status was found to be associated with the risk of emotional neglect and physical punishment.

In this study, however, the recruitment process introduces a potential source of bias. It is not known how representatives of the wider population that

* NSSP is a collaboration among CDC, federal partners, local and state health departments, and academic and private sector partners. They collect, analyse, and share electronic patient encounter data received from emergency departments, urgent and ambulatory care centres, inpatient healthcare settings, and laboratories.

[†] March 2020

[‡] The extent that parents indicated that social isolation and social distancing made it difficult to parent

respondents were; more than half (53.5%) were educated to at least degree level and the majority (73.4%) identified as White.

The third report presents the findings from two studies; a cross-sectional survey* and a longitudinal study.²⁶ In the first study, a bespoke questionnaire was administered by an online survey research and data collection company. Respondents were asked questions about their pandemic-related parenting stress and loneliness and pandemic-related perceived changes in parenting. In the second study, mothers who were already enrolled in a prospective longitudinal study were contacted again to invite them to take part in a pandemic-related follow-up (time 5, when the child was between 5 and 6½ years). Along with standardised questionnaires, participants (n=106) were asked about their pandemic-related parenting stress and loneliness and pandemic-related perceived changes in parenting as well as about their concerns about the financial impact of the pandemic and food insecurity.

In the first study, parents (n=405) reported increased physical and verbal conflict and neglect which were associated with their perceived stress and loneliness. In the second study, over a third of participants (38.6%) reported that had experienced pandemic-related employment financial loss (furloughed, made redundant or reduced work hours) for themselves or their partner. Mothers who reported employment financial loss had significantly higher child maltreatment risk scores than mothers in households with no financial loss. Mothers with children who had received free school meals pre-pandemic perceived more difficulty in feeding their children and reported more conflict with their children since the pandemic began. In both studies, parents who experienced more loneliness also reported more adverse changes in their parenting behaviours.

It is not possible to tell how representative of the wider population those taking part in either study were. In the first study, the majority of participants were White (72%) and many reported being educated to a degree level (42%). In the second study, participants had been assessed, pre-pandemic, at lower risk of child abuse compared to the sample of the full longitudinal study.

²⁴ Swedo E, Idaikkadar N, Leemis R, Dias T, Radhakrishnan L, Stein Z, et al. Trends in U.S. Emergency Department Visits Related to Suspected or Confirmed Child Abuse and Neglect Among Children and Adolescents Aged <18 Years Before and During the COVID-19 Pandemic - United States, January 2019-September 2020. *MMWR Morb Mortal Wkly Rep* 2020; 69:1841-7. [doi:10.15585/mmwr.mm6949a1](https://doi.org/10.15585/mmwr.mm6949a1).

²⁵ Lee SJ, Ward KP, Lee JY, Rodriguez CM. Parental Social Isolation and Child Maltreatment Risk during the COVID-19 Pandemic. *J Fam Viol* 2021. [doi:10.1007/s10896-020-00244-3](https://doi.org/10.1007/s10896-020-00244-3).

* Same study as Lee SJ, Ward KP, Lee JY, Rodriguez CM. *Parental Social Isolation and Child Maltreatment Risk during the COVID-19 Pandemic. J Fam Viol* 2021. [Doi:10.1007/s10896-020-00244-3](https://doi.org/10.1007/s10896-020-00244-3). but different aspects

²⁶ Rodriguez CM, Lee SJ, Ward KP, Pu DF. The Perfect Storm: Hidden Risk of Child Maltreatment During the Covid-19 Pandemic. *Child Maltreat* 2020;1077559520982066. [doi:10.1177/1077559520982066](https://doi.org/10.1177/1077559520982066).

Healthcare

One study from Australia investigated the impact of COVID-19 on dental services provided through the Child Dental Benefits Schedule. Hopcraft et al analysed routine collected data about the number of services provided each month from February to June 2020 compared to the same time period in 2019.²⁷ A significant decrease in total dental services provided in March to May 2020 was observed. Similar decreases were seen in diagnostic, preventative and restorative services.

²⁷ Hopcraft M, Farmer G. Impact of COVID-19 on the provision of paediatric dental care: Analysis of the Australian Child Dental Benefits Schedule. *Community Dent Oral Epidemiol* 2020. [doi:10.1111/cdoe.12611](https://doi.org/10.1111/cdoe.12611).

Learning during lockdown

Zaccoletti et al examined the impact of COVID-19 related restrictions on Italian and Portuguese students' academic motivation.²⁸ Parents of children in grades 1-9* were recruited through social media and university networks. Participants were asked to complete a survey questionnaire about their child's motivation for learning before the onset of the pandemic and during lockdown. Respondents from different regions in Italy (n=173) and Portugal (n=394) took part.

In both countries, parent-reported academic motivation and participation in extracurricular activities decreased during the COVID-19 lockdown. Greater reductions in motivation for learning were reported for pupils with higher pre-COVID-19 motivation scores. Likewise, decreases in the level of participation in extracurricular activities was significantly higher for pupils with higher pre-COVID levels. Children's age was positively and significantly associated with the rate of change in motivation with older pupils showing lower decreases.

In this study, however, the method of recruitment introduces a potential source of bias. It is not possible to tell how representative of the wider population those taking part were; parents were reported to be educated to a high level. There is a reliance on parent's recall of academic motivation pre-pandemic. This report does not appear to have taken into account that many opportunities for extracurricular activities will have been restricted to limit the transmission of COVID-19.

²⁸ Zaccoletti S, Camacho A, Correia N, Aguiar C, Mason L, Alves RA, et al. Parents' Perceptions of Student Academic Motivation During the COVID-19 Lockdown: A Cross-Country Comparison. *Front Psychol* 2020;11:592670. [doi:10.3389/fpsyg.2020.592670](https://doi.org/10.3389/fpsyg.2020.592670).

* Primary to lower secondary school

Teacher wellbeing

Stachteas & Stachteas investigated the psychological effect of COVID-19 on secondary teachers during the early stages* of the pandemic.²⁹ Participants (n=226) were asked to answer five single-answer questions about a) fear and stress, b) optimism about the outcome c) depression, d) desire to return to work, e) concern over the implementation of distance learning with responses on a 6-point Livert scale (1: 'not at all' to 6: 'always').

About a third of teachers (34%) reported that they felt anxious or very anxious about the pandemic. Higher levels of fear and depression were observed in female teachers compared to male teachers. Having school-aged children at home was found to be associated with higher levels of stress and fear related to the pandemic. The majority of teachers (60.6%) said that they were moderately optimistic about the outcome of the pandemic. However, teachers with higher levels of education expressed less optimism about the outcome of the pandemic.

This study, however, was undertaken in one province in Greece using a non-standardised questionnaire early in the pandemic so may not represent the views of teachers as the pandemic progressed. It is not clear from this report what the response rate was, how teachers were recruited or how representative of the wider population those taking part might be.

²⁹ Stachteas P, Stachteas C. The psychological impact of the COVID-19 pandemic on secondary school teachers. *Psychiatriki* 2020;31:293–301. [doi:10.22365/jpsych.2020.314.293](https://doi.org/10.22365/jpsych.2020.314.293).

* Questionnaire administered 24-29th March 2020

APPENDIX: Method*

Search terms

- #1. coronavirus or corona virus or ncov* or covid* or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19
- #2. Child* or adolescen* or teen* or young person or young people or pupil*
- #3. Early years or childcare or nurser* or preschool* or pre-school* or kindergarten* or daycare or day care or school* or educational establishment* or "place of education" or special educational needs or (education* AND setting*) or teacher
- #4. #2 OR #3
- #5. #1 AND #4

Sources[†]

- Medline
- Embase
- LitCovid
- MedRxiv
- SSRN
- Proquest Coronavirus Research Database
- Proquest databases (Public Health, ASSIA, Sociological Abstracts)
- Don't forget the Bubbles
- Covid-19 Evidence Reviews (VA Syntheses Program)
- WHO Global literature on coronavirus disease
- UNICEF website
- UNICEF Children & COVID-19 Research Library
- Oxford COVID-19 Evidence Service
- RCPCH COVID-19 Research Evidence Summaries
- Evidence Aid
- HIQA Ireland Evidence Summaries
- HIQA Ireland Database of Public Health Guidance on COVID-19
- Usher Network for Covid-19 Evidence Reviews
- Disaster Lit
- Health Translations SA (South Australia)
- Australian Academy of Science Rapid Research Information Forum
- CoSPACE study
- Scottish Government publications
- PHE COVID-19 Literature Digest
- CDC Morbidity & Mortality Weekly Report
- Google Advanced Search

* With thanks to Seona Hamilton, Public Health Librarian, Public Health Scotland

[†] Updated Dec. 20

Inclusion criteria

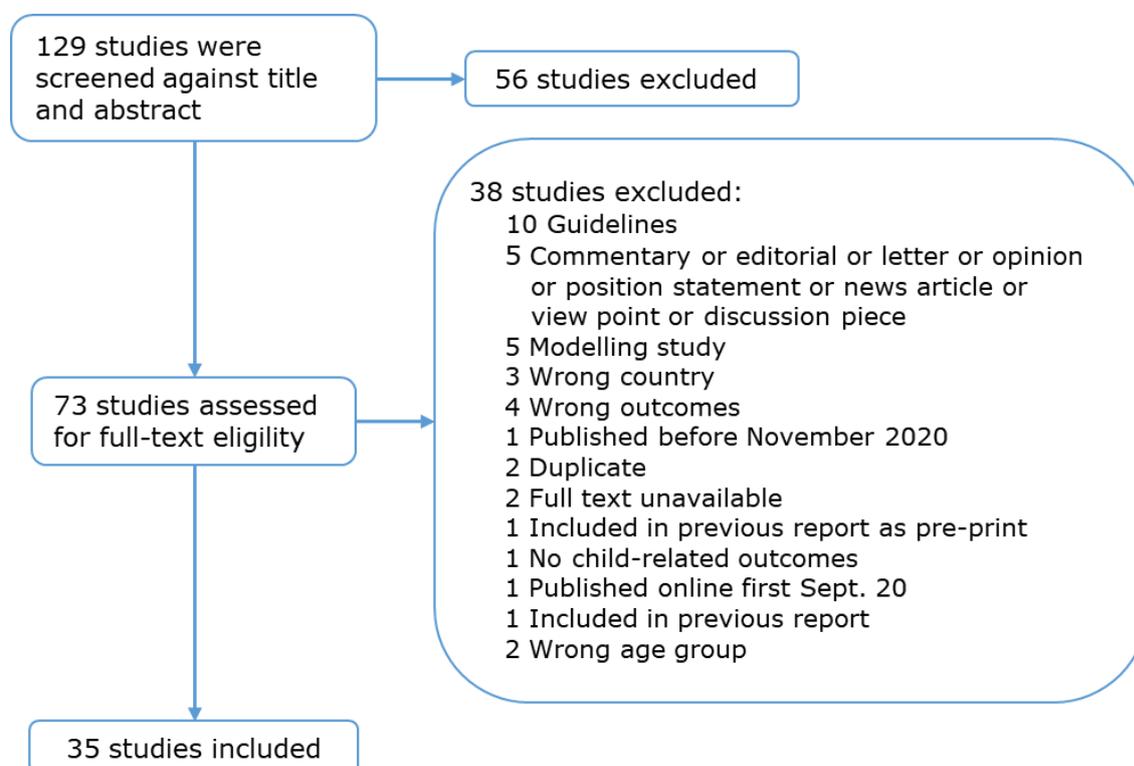
- Studies undertaken in Europe, North America, New Zealand or Australia
- Studies that report outcomes related to children and young people up to age 18 years living in community settings
- Studies that report transmission of COVID-19 in settings relevant to early learning and childcare, primary or secondary level schools
- Published in English
- Published or updated 11th December 2020 – 1st January 2021.

Exclusion criteria

- Studies relating to further or higher education settings
- Papers that report modelling studies
- Studies that examine the clinical manifestations, diagnosis or treatment of Covid-19 in a paediatric population
- Articles which are commentaries, editorials, position statements, letters, news articles, discussion or opinion pieces
- Guidelines for schools or 'hints and tips' for teachers
- Study protocols

Selection process

The titles and abstracts were screened for potential inclusion using the agreed inclusion/exclusion criteria. The full text of each potential paper was then assessed for inclusion. The progress of the papers through the selection process is summarised in the diagram below.



**COVID-19 in Children and Young People:
Literature Scanning Report 8 (supplement - transmission)
(11-18.12.20)**

Research question

What is the current knowledge about Covid-19 and children and young people?

This additional paper reports studies which focus on aspects of the role of children and young people in the transmission of SARS-CoV-2 published between 11th and 18th December.

The details of the included papers are in the appendix on page 7

Reports of potential interest

Included in this report

- [National Collaborating Centre for Methods and Tools. Living Rapid Review Update 11: What is the specific role of daycares and schools in COVID-19 transmission?](#)
- Krishnaratne S, Pfadenhauer LM, Coenen M, Geffert K, Jung-Sievers C, Klinger C, et al. Measures implemented in the school setting to contain the COVID-19 pandemic: a scoping review. *Cochrane Database Syst Rev* 2020; 12:CD013812. [doi:10.1002/14651858.CD013812](#).
- Office for National Statistics. [COVID-19 Schools Infection Survey Round 1, England: November 2020](#). ONS; 2020.

Findings

Transmission

Six reports met the inclusion criteria; three were reviews of international studies and three were primary studies from America, Canada and England.

International reviews

The latest update of the National Collaborating Centre for Method and Tools' 'Living Rapid Evidence Review' about the role of day care and schools in COVID-19 transmission includes literature published up to 30th November.¹ In this update, seventeen new single studies, two new syntheses and two in-progress single studies were added. In addition, 26 policy documents were included to examine the infection control policies in place in the countries/regions with published data about transmission included in the review.

Overall, this review concluded that the risk of transmission from children-to-children and children-to-adults in primary school and day care settings appeared low, when infection control measures were in place. However, the certainty of the evidence was assessed as low. Within clusters and outbreaks, adult-to-adult transmission seemed to be more common than child-to-adult or adult-to-child. Certainty of this evidence was considered to be very low. Implementation of infection control measures appeared to be important in limiting the spread of COVID-19. Across the countries/regions reviewed, there was a wide variability in infection control policies in place. This meant that it was difficult to evaluate the impact of specific infection prevention and control measures or make best practice recommendations for day care or school settings.

In a Cochrane rapid scoping review, Krishnaratne et al² aimed to identify and map evidence assessing the impacts of measures implemented in school settings in order to re-open and/or keep open schools during the COVID-19 pandemic. International literature up till 8th October 2020 was included. In total, 42 studies met the inclusion criteria; nine were published journal publications, four were reports and the remainder were pre-print publications. The majority (n=31) reported modelling studies with the remainder using an observational (n=9) or experimental/quasi-experimental design (n=2).

The included studies described three broad intervention categories: organisational measures to reduce the transmission of SARS-CoV-2, structural and environmental measures to reduce the transmission of SARS-CoV-2 and surveillance and response measures in relation to SARS-CoV-2 infection. Organisational measures included strategies to make contacts safer such as policies about face mask wearing, hand hygiene and general physical distancing and those that aimed to reduce the opportunity for contact such as staggered arrival/departure or break times, formation of cohorts and phased opening of schools. Structural and environmental measures included structural changes to facilitate physical distancing such as removal of furniture, increased distancing between desks and changes to ventilation systems. Surveillance measures included testing, tracing and symptom screening.

The majority of studies (n=36) assessed or modelled the impact of organisational measures to reduce the transmission of SARS-CoV-2. Few evaluated the impact of a measure implemented in the 'real world'. Those that did, tended to be mainly descriptive which limits the ability to draw firm conclusions about the effectiveness of any one strategy. In addition, the majority of the included studies were undertaken when the community prevalence of SARS-CoV-2 infections was relatively low. None of the included studies looked at the effect of the measures on the psychological wellbeing of pupils, teachers and/or school staff.

The third review examined the evidence about household transmission of SARS-CoV-2.³ The authors searched one database using a variety of terms related to SARS-CoV-2 in combination with terms linked with household transmission. Literature up to 19th October 2020 was included. In total, 54 studies were included in this systematic review and meta-analysis. Overall, the estimated mean secondary attack rates for household and family contacts were three times higher than for close contacts. Fifteen studies reported separate secondary attack rates to children and adult contacts. The estimated mean household secondary attack rate was found to be significantly higher to adult contacts than to child contacts. These findings should be interpreted with a degree of caution as there was considerable heterogeneity among the studies which brings the validity of the meta-analysis into question. In addition, while the stated aim of this review was to compare household transmission of SARS-CoV-2 with other coronaviruses, no details of the studies looking at household transmission of SARS-CoV or MERS-CoV are presented in this report. The authors conclude that household secondary attack rates are higher for SARS-CoV-2 than SARS-CoV and MERS-CoV.

America

Using a case control study, Hobbs et al⁴ aimed to assess factors linked with positive SARS-CoV-2 tests in children and adolescents (<18 years) who presented at an outpatient testing healthcare centre or emergency department associated with the University of Mississippi Medical Centre. Children with negative SARS-CoV-2 RT-PCR test results were frequency matched with positive case patients by age group*, sex and test date[†]. Parents/caregivers were interviewed by telephone to collect information about symptoms, contacts with people with known COVID-19, school or child-care attendance, mitigation measures adhered to in school/child-care and outside the home as well as demographic details.

Of 898 potentially eligible children, information was collected from 397 parents/caregivers[‡]; 154 had tested positive (case participants) and 243 had tested negative (control participants). In-person school or child-care attendance in the fourteen days before the SARS-CoV-2 test was not found to be associated with having a positive test result. Children and adolescents who had positive test results were more likely to report close contact with a person with confirmed COVID-19 compared to their similarly aged peers who had tested negative for SARS-CoV-2. Among all participants who reported a close contact with someone with confirmed COVID-19, case participants were more likely to report that the

* 1-3 years, 4-8 years, 9-14 years and 15-17 years

† 1st-24th September, 22nd September – 18th October and 14th October – 5th November

‡ 494 refused to take part or could not be contacted, five were excluded following hospitalisation with COVID-19.

contact was a family member and less likely to report that the contact was a school or child-care class mate compared to control participants.

Parents of case participants were less likely than those of control participants to report consistent mask use indoors in their child's school or child-care facility.*

The findings of this study should be interpreted with a degree of caution for a number of reasons. Parental recollection of mask use may not accurately reflect the actual usage as the average time between the RT-PCR test being carried and the parental/caregiver interview was 32 days. In addition, if participating parents were aware of the public health recommendations, they may have answered the interview questions in ways that were considered to be socially desirable. More than half of the eligible parents could not be contacted or refused to take part in this study. It is possible that those taking part differed in a fundamental way (for example, socio-demographic background) from those that did not.

Canada

Manny et al⁵ aimed to examine the impact of non-pharmaceutical interventions on seropositivity for SARS-CoV-2 among children aged eight to thirteen years. This pre-print presents an interim analysis of information collected from participants recruited from 16th August to 23rd October 2020[†] in one region in Canada. Participants were recruited from two existing study cohorts along with their friends, families and through social networks. Parents were asked about their child's frequency of use of non-pharmaceutical interventions such as mask or hand sanitiser use outside the home and avoidance of crowds during three time periods (January to March, April to August and September 2020). In addition, parents were asked about the number of and size of gatherings (of more than 10 people) that their child had attended and whether they had taken part in organised sports activities since March 2020 until the date of study recruitment. Venous blood samples from participating children were taken and tested for the presence of SARS-CoV-2 IgG antibodies.

In this preliminary report, information about 565 children was included. None of the children were reported to have had a positive SARS-CoV-2 RT-PCR test. Based on the level of IgG SARS-CoV-2 antibodies, one child was determined to be seropositive[‡] and another eight were likely seropositive[§]. Being likely seropositive was found to be linked with mask usage and the number of gatherings the child had attended. However, the small number of seropositive children in this study limits the power to examine associations with the use of

* Universal mask use inside school and child-care facilities was recommended, by the state department of health, for children ≥ 2 years and staff members at the time of the study.

[†] Schools reopened on 3rd September

[‡] IgG ≥ 1.4

[§] IgG ≥ 0.8 and < 1.4

non-pharmaceutical interventions. A distinction between indoor and outdoor gatherings and organised sports activities does not seem to have been made in the questionnaire. It is not possible to tell from this report if the participants were representative of the wider population. The recruitment process and reliance on parental recall of their child's activities and use of non-pharmaceutical interventions several months previously introduces potential sources of bias.

England

In order to investigate the role of schools in COVID-19 transmission, the Office for National Statistics in England are surveying pupils and school staff attending participating schools at regular intervals.⁶ This report presents the first round of the survey undertaken between 3rd and 19th November. The aim is to recruit 100 secondary schools and 50 primary schools across fifteen local authorities. Within participating schools, all staff were eligible to take part, pupils in all primary schools could take part as well as secondary pupils in two consecutive year groups. Nasal swabs were taken from all participants to test for current SARS-CoV-2 infection. Saliva samples from pupils and capillary blood samples from school staff were obtained and tested for SARS-CoV-2 antibodies. Participants were asked to complete an online questionnaire.

This report presents an unweighted summary of estimates based on information from 105 schools in fourteen local authorities; nine local authority areas had high community prevalence of the virus and five were low prevalence areas. Among people who attended school on the day of testing 1.24% of pupils (65/5,235) and 1.29% of staff (53/4,122) tested positive for current infection. The proportion of primary school aged pupils who tested positive was 0.89% (19/2,126) compared to 1.48% (46/3,099) of secondary pupils. Similarly, the percentage of primary school staff testing positive for current infection was 0.75% (1/1,068) compared to 1.47% (45/3,054). These differences were not found to be statistically significant. In secondary schools in high prevalence areas, 1.73% (32/1,853) of pupils and 1.62% (33/2,035) of staff tested positive for current infection. In secondary schools in low prevalence areas, 1.12% (14/1,246) of pupils and 1.18% (12/1,019) of staff tested positive for current infection.

Less than half of the schools returned information about the infection control measures implemented. Across primary and secondary schools, the most implemented measures included hand sanitisers, frequent hand washing and increased cleaning of frequently touched surfaces. The least implemented measure was the wearing of masks or face coverings by pupils in the classroom

¹ National Collaborating Centre for Methods and Tools. [Living Rapid Review Update 11: What is the specific role of daycares and schools in COVID-19 transmission?](#)

² Krishnaratne S, Pfadenhauer LM, Coenen M, Geffert K, Jung-Sievers C, Klinger C, et al. Measures implemented in the school setting to contain the COVID-19 pandemic: a scoping review. *Cochrane Database Syst Rev* 2020; 12:CD013812. [doi:10.1002/14651858.CD013812](https://doi.org/10.1002/14651858.CD013812).

³ Madewell ZJ, Yang Y, Longini IM, Halloran ME, Dean NE. Household Transmission of SARS-CoV-2. *JAMA Netw Open* 2020; 3:e2031756. [doi:10.1001/jamanetworkopen.2020.31756](https://doi.org/10.1001/jamanetworkopen.2020.31756).

⁴ Hobbs CV, Martin LM, Kim SS, Kirmse BM, Haynie L, McGraw S, et al. Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years — Mississippi, September–November 2020. *MMWR Morb Mortal Wkly Rep* 2020; 69. [doi:10.15585/mmwr.mm6950e3](https://doi.org/10.15585/mmwr.mm6950e3).

⁵ Manny E, Carroll A, Charlton C, Robinson J, Subbarao P, Azad MB, et al. [Increased Mask Use and Fewer Gatherings Associated with Lower SARS-CoV-2 Seropositivity Among Young School-Age Children. \(Preprint\)](#) 2020.

⁶ Office for National Statistics. [COVID-19 Schools Infection Survey Round 1, England: November 2020](#). ONS; 2020.

Appendix: Included studies

CHARACTERISTIC	SUMMARY
Reference	Hobbs CV, Martin LM, Kim SS, Kirmse BM, Haynie L, McGraw S, et al. Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years – Mississippi, September–November 2020. MMWR Morb Mortal Wkly Rep 2020;69. doi:10.15585/mmwr.mm6950e3.
Aims	To assess school, community, and close contact exposures associated with paediatric COVID-19
Study design/setting	Case control study; 1 st September – 5 th November, 2020
Population	Children and adolescents aged <18 years who received testing for presence of SARS-CoV-2 in nasopharyngeal swab specimens by RT-PCR at outpatient testing health care centers (including drive-up testing locations) or emergency departments associated with the University of Mississippi Medical Center
Country	US
Method	Recruitment: Parents/caregivers were contacted by telephone Method: Lists of children and adolescents with an electronic medical record of a SARS-CoV-2 test within the study period were randomly ordered by laboratory result. Children with negative SARS-CoV-2 RT-PCR test results were frequency matched to the number of case-patients enrolled by age group (0–3, 4–8, 9–14 and 15–17 years), sex, and test date interval (September 1–24, September 22–October 18, and October 14–November 5, 2020. Parents/caregivers were interviewed by telephone to collect information about participant demographic characteristics, symptoms, close contact (within 6 feet for ≥15 minutes) with a person with known COVID-19, school or child care attendance, and family or community exposures ≤14 days before the SARS-CoV-2 test. For participants who attended in-person school or child care, parents or guardians were asked about the frequency of mask use among students and staff members inside the facility. Parents were also asked about frequency of mask use and social distancing by child and among other persons present for each community exposure.

	<p>Analysis: Descriptive and statistical analyses were performed to compare case-patients with control participants, assessing differences in demographic characteristics, school, community exposures, and close contact. Logistic regression models accounting for child sex, age group, and race/ethnicity were used to estimate ORs and 95% CIs, comparing odds of exposures among case-patients and control participants. In each model, SARS-CoV-2 test result (i.e., positive or negative) was the outcome variable, and each exposure response was the predictor variable.</p>
Results	<p>896 potentially eligible children (290 with positive test results and 606 with negative test results for SARS-CoV-2) were identified and telephoned an average of 32 days after SARS-CoV-2 testing. 494 parents or guardians could not be contacted or refused, and five were excluded because the child had been hospitalized with COVID-19.</p> <p>Information from 397 participants was collected, including 154 case-patients (positive SARS-CoV-2 test results) and 243 control participants (negative SARS-CoV-2 test results).</p> <p>Overall, case-patients were more likely to have had close contact with a person with known COVID-19 than control participants (aOR = 3.2, 95% CI = 2.0–5.0); 64% of close contacts of case-patients and 48% of those of control participants were family members (p = 0.02), whereas school or child care classmates were reported as close contacts for 15% and 27%, respectively (p = 0.04).</p> <p>In-person school or child care attendance ≤ 14 days before the SARS-CoV-2 test was reported for 62% of case-patients and 68% of control participants and was not associated with a positive SARS-CoV-2 test result (aOR = 0.8, 95% CI = 0.5–1.3).</p> <p>Among 236 children aged ≥ 2 years who attended child care or school during the 2 weeks before the SARS-CoV-2 test, parents of 64% of case-patients and 76% of control participants reported that their child and all staff members wore masks inside the facility (aOR = 0.4, 95% CI = 0.2–0.8). 27% of all parents whose children attended social gatherings reported mask use by all persons present and 46% reported adherence to social distancing, whereas 16% and 39%, respectively reported mask use and social distancing when having visitors in the home.</p>
Comments	<p>Limited to one hospital facility. Parent recall – the average time between test and interview was 32 days. Potential social desirability bias if interviewee knew what public health recommendations were. More than half of parents could not be contacted or refused. Not</p>

	known if representative of wider population. Did not take into account any socio-economic/demographic differences between the two groups (potential confounder).
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CHARACTERISTIC	SUMMARY
Reference	Krishnaratne S, Pfadenhauer LM, Coenen M, Geffert K, Jung-Sievers C, Klinger C, et al. Measures implemented in the school setting to contain the COVID-19 pandemic: a scoping review. Cochrane Database Syst Rev 2020;12:CD013812. doi:10.1002/14651858.CD013812.
Aims	To identify and comprehensively map the evidence assessing the impacts of measures implemented in the school setting to reopen schools, or keep schools open, or both, during the SARS-CoV-2/COVID-19 pandemic. Research Question: what studies are available that have assessed the impacts of measures implemented in the school setting to safely reopen schools, or keep schools open, or both, during the SARS-CoV-2/COVID-19 pandemic?
Study design	Scoping rapid review
Search strategy	Databases: Cochrane COVID-19 Study Register, MEDLINE, Embase, the CDC COVID-19 Research Articles Downloadable Database for preprints, and the WHO COVID-19 Global literature on coronavirus disease on 8 October 2020. Search terms: terms related to SARS-CoV-2/COVID-19 and school settings. Supplemented by forward and backward citation searches of all relevant systematic reviews and guidelines retrieved by our search strategy. In addition, Scopus and Google Scholar were searched.
Inclusion criteria	<ul style="list-style-type: none"> • Populations at risk of becoming infected with SARS-CoV-2 and/or developing COVID-19 disease <ul style="list-style-type: none"> ○ Students attending a year level corresponding to the primary or secondary educational stage (approx. age 4-18 years) ○ Teachers working in the school setting ○ Other staff working in the school setting (e.g. facility managers, cleaning personnel, management, social workers, school health staff)

	<ul style="list-style-type: none"> ○ Individuals indirectly impacted by the school setting (e.g. parents, carers, relatives, peers of directly impacted individuals, other members of the community) • School setting, i.e. in and around schools, including boarding schools (e.g. transportation to and from school and school-related extracurricular activities are considered part of the school setting) • Measures implemented to safely reopen schools and/or keep schools open during the SARS-CoV-2/COVID-19 pandemic (including reactive school closures) <ul style="list-style-type: none"> ○ For reactive school closures, the trigger for closing the school would have to lie within the school setting (e.g. number of cases within school) • Studies that quantitatively assess impact (e.g. epidemiologic studies, modelling studies) • Mixed methods studies that allow for extraction of quantitative impact measures • Diagnostic studies that assess the impact of relevant interventions beyond diagnostic test accuracy • Published in 2020
Exclusion criteria	<ul style="list-style-type: none"> • Populations not at risk of becoming infected with COVID-19 • Studies not targeting human transmission • Schools whose main focus is on caring for rather than providing education to young children (e.g. early child care such as daycare or nurseries) • Kindergarten, where the primary purpose is childcare rather than education (e.g. in Germany) • Schools targeting adults (e.g. adult education centres, trade schools, professional schools) • Universities, colleges or other institutions providing tertiary education • Interventions not related to COVID-19 • All COVID-19-related interventions not implemented in the school setting, including a range of containment and mitigation measures (e.g. community-based quarantine, personal protective measures, hygiene measures, bans on mass gatherings and other social-distancing measures) • Empirical studies without quantitative measures (e.g. qualitative studies) • Diagnostic studies only reporting diagnostic accuracy measures • Non-empirical studies (e.g. commentaries, narrative and systematic reviews)

Countries	Of the studies that were conducted in real-world contexts or that used real data from a given country, 20 used data from the WHO European region (EUR), 13 from WHO region of the Americas, six from the WHO Western Pacific region, one from WHO Eastern Mediterranean Region
Method	Independent review by two reviewers at title & abstract and full text. Extraction by one reviewer.
Results	<p>42 studies met the inclusion criteria. The majority of studies (n = 29) were published on preprint servers, four were published as reports and nine as journal publications.</p> <p>The majority of the included studies employed a mathematical modelling design (n = 31); nine studies used an observational/epidemiological design, two studies an experimental or quasi-experimental design and one experimental study was combined with mathematical modelling.</p> <p>Most studies (n = 25) assessed students as the main population. Teachers (n = 17) and school staff (n = 14) were usually assessed as a subpopulation together with students.</p> <p>Included studies fell into three broad intervention categories: organizational measures to reduce transmission of SARS-CoV-2, structural and environmental measures to reduce transmission of SARS-CoV-2, and surveillance and response measures in relation to SARS-CoV-2 infections.</p> <p>The impact of organizational measures to reduce transmission of SARS-CoV-2 was assessed or modelled in 36 studies. This category describes two types of measures: measures to make contacts safer and measures to reduce the opportunity for contact. Measures to make contacts safer included interventions such as face mask policies, hand hygiene policies, respiratory etiquette, general physical distancing policies, as well as the modification of activities to reduce the risk of transmitting SARS-CoV-2 (e.g. not singing in music classes). Measures to reduce the opportunity for contact included staggered arrival, break and departure times, alternating attendance (e.g. daily or weekly rotations), phased reopening of schools (e.g. small cohort of students returning initially), formation of cohorts (e.g. bubbles or pods to which specific students are assigned), cancellation of activities (e.g. physical education classes) and stay-at-home policies for sick students and staff.</p> <p>The impact of structural and environmental measures to reduce transmission of SARS-CoV-2 was assessed or modelled in 11 studies. These studies evaluated structural changes</p>

	<p>implemented to facilitate physical distancing (e.g. school yard division), distance between desks, removal of furniture, enhancements or changes to ventilation systems, and enhancements to cleaning regimens.</p> <p>Nineteen studies assessed or modelled surveillance and response measures in relation to SARS-CoV-2 infections. Surveillance measures included testing, tracing, and symptom screening (e.g. fever screening).</p> <p>The outcomes assessed in the included studies mostly fall into four broad subcategories: transmission-related outcomes, healthcare utilization, other health outcomes and societal, economic, and ecological implications.</p> <p>School measures are mostly assessed with regards to their potential to reduce transmission of SARS-CoV-2. A much smaller proportion of studies looked at other outcomes of interest, including other health outcomes and societal, economic and ecological outcomes. For example, none of the included studies assessed the economic implications in parents or caretakers (e.g. job loss, loss of income). Also, no studies looked at the effect of these measures on the psychosocial well-being and mental health of students, teachers and other school staff.</p> <p>Most studies assessed the implementation of measures in schools when the burden of SARS-CoV-2 infections was comparatively low, that is, after the large surges seen between February and May 2020.</p> <p>Most of the studies presented, used data from, or were focused on, high-income countries, but regional differences, or even school level differences relating to socio-economic status might heavily influence how interventions are implemented and taken up, and this was rarely commented on within the identified studies.</p> <p>Few included studies can be considered 'realworld' studies, meaning that they evaluate the impact of a measure implemented in a real school on a real population. The few studies of this nature tended to be descriptive, which precludes making robust inferences about effectiveness.</p>
Comments	This review does not report on the effectiveness of the measures.

CHARACTERISTIC	SUMMARY
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Reference	Madewell ZJ, Yang Y, Longini IM, Halloran ME, Dean NE. Household Transmission of SARS-CoV-2. JAMA Netw Open 2020;3:e2031756. doi:10.1001/jamanetworkopen.2020.31756.
Aims	To examine evidence for household transmission of SARS-CoV-2 and to compare it with other coronaviruses
Study design	Systematic review and meta-analysis; up to 19 th October 2020
Search strategy	Databases: PubMed Search terms: Terms related to SARS-CoV-2 and COVID-19 in combination with secondary attack rate, household, close contacts, contact transmission, contact attack rate, or family transmission
Inclusion criteria	All articles with original data for estimating household secondary attack rate were included.
Exclusion criteria	<ul style="list-style-type: none"> • case reports of individual families or households • reported infection prevalence in the household without describing transmission • tested household contacts using antibody tests • close contacts that did not report secondary attack rates for household or family members • overlapping populations with another study already included in the review • preprints of published articles already included in the review
Countries	Not stated
Method	<p>Single reviewer screening, quality assessment and extraction.</p> <p>Quality assessment: modified version of the Newcastle-Ottawa quality assessment scale for observational studies. Studies received points based on participant selection (4 points), study comparability (1 point), and outcome of interest (4 points). Studies were classified as having high (3 points), moderate (4-6 points), and low (7 points) risk of bias.</p> <p>Analysis: Meta-analyses were done using a restricted maximum likelihood estimator model to yield a point estimate and 95% CI for secondary attack rate for each subgroup analysed, with a random effect for each study. To make comparisons across exposure types, study was treated as a random effect, and exposure type was a fixed moderator.</p>

	<p>Variables had to have been collected in at least 3 studies to be included in meta-analyses. The Cochran Q test and I^2 statistic are reported as measures of heterogeneity. I^2 values of 25%, 50%, and 75% indicated low, moderate, and high heterogeneity.</p> <p>When at least 10 studies were available, funnel plots, Begg correlation, and Egger test were used to evaluate publication bias, with significance set at $P < 0.10$. If publication bias was detected, the Duval and Tweedie trim-and-fill approach was used for adjustment.</p>
Results	<p>54 studies were included; 44 of household contacts and 10 of family contacts. <i>Information related to children extracted only.</i> 15 studies reported separate secondary attack rates to child and adult contacts.</p> <p>Estimated mean secondary attack rate for household contacts was 16.4% (95% CI, 13.4%-19.6%) and family contacts was 17.4% (95% CI, 12.7%-22.5%). Secondary attack rates for household and family contacts were more than 3 times higher than for close contacts (4.8%; 95% CI, 3.4%-6.5%; $P < .001$).</p> <p>Age was the most examined covariate, with most studies reporting lower secondary transmission of SARS-CoV-2 to child contacts than adult contacts.</p> <p>The estimated mean household secondary attack rate was significantly higher to adult contacts (28.3%; 95% CI, 20.2%-37.1%) than to child contacts (16.8%; 95% CI, 12.3%-21.7%; $P < .001$).</p> <p>Several studies examined factors associated with infectiousness of index cases. Estimated mean household secondary attack rate from adults (15.2%; 95% CI, 6.2%-27.4%) was not significantly different than that from children (7.9%; 95% CI, 1.7%-16.8%).</p> <p>Household secondary attack rates were higher for SARS-CoV-2 than SARS-CoV and MERS-CoV.</p>
Comments	<p>The majority of the detail of this study is included in supplementary tables rather than the main body of the article. While stated aim was to compare with other coronavirus and search terms in supplement suggest they were included in the search, no details of the studies found are included in this report. Significant heterogeneity was found among studies of household ($I^2=96.9\%$; $P < .001$), family ($I^2=93.0\%$; $P < .001$), and close ($I^2 = 97.0\%$; $P < .001$) contacts which casts doubt on the validity of undertaking this meta-analysis. Only one database was searched so it is possible that relevant publications were missed.</p>

CHARACTERISTIC	SUMMARY
Reference	Manny E, Carroll A, Charlton C, Robinson J, Subbarao P, Azad MB, et al. Increased Mask Use and Fewer Gatherings Associated with Lower SARS-CoV-2 Seropositivity Among Young School-Age Children. (preprint) 2020.
Aims	To examine the impact of non-pharmaceutical interventions on seropositivity for SARS-CoV-2
Study design/setting	Longitudinal design; this report presents interim analysis of data collected from participants recruited from August 14th - October 23th, 2020. All schools in Edmonton were closed on March 16, 2020 and re-opened on September 3, 2020. Mask use in school when physical distancing cannot be maintained is mandatory for children in grade 4 or higher (10 – 13-year-old) and optional for grade 2 and 3 children (8 – 10 years).
Population	Children 8-13 years
Country	Edmonton, Canada
Method	<p>Recruitment: Participants from the Edmonton Canadian Health Infant Longitudinal Development (CHILD) and Edmonton Alberta Pregnant Outcomes and Nutrition (APrON) cohorts, their friends, similar-aged cousins living in different households, and families responding to media were invited to take part in this study. Only one child per household was recruited for this study</p> <p>Method: At baseline, parents completed a questionnaire regarding the child’s frequency (never, rarely, occasionally, often, always) of NPI including mask use, hand sanitizer usage outside the home, avoidance of crowds, avoidance of common greetings (i.e. hugs and handshakes), and practising social distancing. The NPI questions were amended to specify 3 separate timeframes (January to March 2020, April to August 2020, and September 2020). Parents reported on the number of gatherings (defined as more than 10 people) the child attended from March 2020 to the time of consent. Parents reported on whether their child participated in organized sport from March 2020 to the time of consent. Parents were asked to report the size of the group participating in the activity (0-9 children, 10-19 children, 20-29 children, 30 or more children).</p> <p>Venous samples tested for the presence of SARS-CoV-2 IgG antibodies</p>

	<p>Analysis: Univariate analyses included Fisher's exact testing for categorical predictors, ranksum for count variables (e.g. number of gatherings), and t-test for continuous variables (e.g. BMI, income). Multiple variable logistic regression (robust errors) was used to model the relationship between NPI, gathering, a child being seropositive or likely seropositive while controlling for participant age, and whether the child returned to in-person school.</p>
Results	<p>565 children with a mean age of 10.5 years (SD 1.6) were included in this preliminary analysis. None of the children recruited reported a positive SARS-CoV-2 RT-PCR result prior to recruitment. One child was seropositive (IgG\geq1.4) and eight additional children were likely seropositive (IgG \geq0.8 and <1.4).</p> <p>Among all participants, 25% of those children who reported contact with an individual with COVID-19 were likely seropositive (1/4) compared to 1.4% (8/561) without contact (p=0.06).</p> <p>Five participants (<1%) had been diagnosed as probable cases of COVID-19 by a health care practitioner but no RT-PCR testing was completed (all seronegative; IgG<0.8).</p> <p>Most children (95%; 534/565) had one or more symptoms associated with COVID-19 in the 6 to 8 months prior to recruitment. Almost 1/5 of children (107/565) experienced respiratory symptoms requiring isolation and/or testing by local government guidelines.</p> <p>There were no significant differences in seropositive or likely seropositive children by sex, BMI, serology measurement date, median family income, or the number of times the child was in a >10 person gathering (p>0.05). Similarly, neither age (linear) nor whether the child was less than or greater than 10 years of age (dichotomous) were significantly associated with seropositivity.</p> <p>Presence of COVID-19 symptoms individually, by number of symptoms or seminal symptoms (fever, cough, shortness of breath, sore throat, or rhinitis) did not predict being likely seropositive (IgG \geq0.8 and <1.4).</p> <p>No significant differences in likely seropositivity among children seen prior to school starting (1.6%; 5/310) compared to children seen minimum 21 days after school started (1.6%; 4/255; p=0.62).</p> <p>Children who did not wear a mask (never, rarely, occasionally) had a 4.2% (5/118) prevalence of likely seropositivity versus 0.9% (4/423) likely seropositive for children who often or always wore their mask (p<0.05).</p>

	<p>Children who participated in organized sports with 10 or more participants had 2.6% (6/228) of being likely seropositive compared to those children who participated in sports with fewer than 10 participants or did not participate (1.0%; 3/310; $p=0.2$).</p> <p>Being likely seropositive was related to mask use and number of gatherings attended. Children who attended greater than 5 gatherings and did not wear a mask had a 4.3% prevalence of being likely seropositive. In contrast, children who attended greater than 5 gatherings and did wear a mask had a 1.8% seropositive prevalence ($p=0.02$).</p> <p>A significant interaction between mask use and number of gatherings ($p<0.01$) on being likely seropositive in multivariate logistic regression. Children had 9.7 increased odds ratio (95% CI 2.4, 38.9; $p=0.001$) of being likely seropositive for each gathering attended while not wearing a mask. Children had 1.02 increased odds ratio (95% CI 1.0, 1.04; $p=0.007$) of being likely seropositive for each gathering attended while wearing a mask.</p> <p>1.6% seropositivity is higher than the Government of Alberta RT-PCR confirmed infection rate in children between 0 and 19 years of age (0.55% overall; 0.17% from March 16th to September 2nd; 0.38% from September 3rd to October 23rd)</p>
Comments	<p>Single assay for seropositivity. Single centre. Questionnaires did not specify if the gatherings or organized sports were indoors or outdoors. Small number of likely seropositive children which limits power to examine symptom associations and NPI use. It is not possible to tell if the participants are representative of the wider population. Recruitment process introduces a potential source of bias. Pre-print. Parents asked to recall activities and NPI use from several months previously (up to 9 months)</p>

CHARACTERISTIC	SUMMARY
Reference	National Collaborating Centre for Methods and Tools. <u>Living Rapid Review Update 11: What is the specific role of daycares and schools in COVID-19 transmission? Published 18th Dec.</u>
Aims	<p>What is the specific role of daycares and schools in COVID-19 transmission?</p> <p>Qi) What is known about the likelihood of transmission of COVID-19 among children and adults in daycare and schools and among children to their household members?</p>

	<p>Qii) What is known about the likelihood of transmission of COVID-19 by toddlers and school-aged children to others in other settings?</p> <p>Qiii) What infection prevention and control policies have been put in place in daycares and schools that have published data on COVID-19 cases amongst students and teachers following re-opening?</p>
Study design	Rapid evidence review
Search strategy	<p>The search strategy and sources are detailed here. This update includes literature up to 30th November.</p> <p>In this version a search was undertaken for infection control policies in place in jurisdictions with published data included in this review.</p>
Inclusion criteria	<ul style="list-style-type: none"> • Children and adolescents aged 1–18 or household members • Exposure to or diagnosis of COVID-19 • Schools, daycares, camps, community and household settings • Confirmed or suspected case of COVID-19 • English-language, peer-reviewed sources and sources published ahead of print before peer review
Exclusion criteria	<ul style="list-style-type: none"> • Infants • Grey literature
Countries	Canada, Netherlands, Germany, America, Italy, Luxembourg, China, Switzerland, Norway, France, England
Method	<p>The results were synthesised narratively. The quality of included evidence was assessed using critical appraisal tools as indicated by the study design. Quality assessment was completed by one reviewer and verified by a second reviewer. Conflicts were resolved through discussion.</p> <p>The Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach was used to assess the certainty in the findings based on eight key domains. The overall certainty of the evidence for each outcome was determined taking in to account the characteristics of the available evidence (observational studies, some not peer-reviewed, unaccounted-for potential confounding factors, different tests and testing protocols, lack of</p>

	valid comparison groups). A judgement of 'overall certainty is very low', means that the findings are very likely to change as more evidence accumulates.
Results	<p>In this update, 17 new single studies, two new syntheses, and two in-progress single studies were identified, for a total of 99 publications addressing the first two questions. 26 policy documents were included to answer the third question.</p> <ul style="list-style-type: none"> • Cumulative surveillance data from Canada (Quebec) demonstrates low incidence rates among students and staff in primary and secondary schools, consistent with previous findings. • New data from the United States also suggests that there is little difference in elementary student case rates whether or not certain infection prevention and control strategies (e.g., student masking, physical distancing, and ventilation) are in place. Nevertheless, differences are seen in staff case rates and the differences appear to be larger in high school settings. However, these data are not adjusted for other mitigation factors occurring in the community or school setting, and the sample is not representative of the US population and should be interpreted with caution. • Five new single studies investigated transmission risk and/or prevalence across preschool and school settings. Overall, findings demonstrated low secondary attack rates and prevalence among students. Household transmission was cited as the most probable source of infection. • Two new syntheses explored child-to-child and child-to-adult transmission in household, community, and school settings; low secondary attack rates among children in household and community settings were reported. There were rare instances of children as index cases, and limited evidence of secondary transmission to school contacts. • Eight new single studies explored transmission from children to others in household and community settings: <ul style="list-style-type: none"> ○ Two studies found living with a child at home or in childcare was not associated with an risk of infection or hospitalization ○ Three studies reported that a parent/adult commonly served as the index case among household cases ○ One study identified that risk of transmission between household members increased with age (i.e., 7.5% among 5-9 year olds vs. 30.2% among aged

	<p>≥65 years), while another reported no difference in attack rates by age within household settings</p> <ul style="list-style-type: none"> ○ One study found that children who test positive after a known COVID-19 exposure were more likely to have been exposed to an infected sibling; although index cases were not established among these cases. • Infection control measures were highly variable across jurisdictions scanned. <ul style="list-style-type: none"> ○ Within daycares most jurisdictions described enhanced hand hygiene (75%, 25% did not describe), cleaning protocols (75%, 25% did not describe), and cohorting (67%, 33% did not describe). Minimizing contact (i.e. physical distancing) between groups of children was described in only two jurisdictions (17%), was not required in 4 jurisdictions (33%) and was not described in 6 (50%). One jurisdiction (8%) required masks for all children, one (8%) in common areas only, and 6 (50%) did not require students to wear masks (33% not described). Masks were required for staff in 66% of settings (not required in 17% and not described in 17%). ○ Within primary schools, most jurisdictions described enhanced hand hygiene (81%, 19% not described), cleaning protocols (69%, 31% not described) and pre-attendance screening (56%, 44% not described). Cohorting was reported in 69% of jurisdictions (31% not described). Over half of the jurisdictions require students to physically distance (69%) while 25% do not require distancing between students, and such was not described in one jurisdiction. Requirements on wearing masks among students was described to varying degrees among 69% of the jurisdictions and was not required in 31% of them. Physical distancing and mask wearing were commonly required amongst staff (75%, 63% respectively). ○ Within secondary schools, almost all jurisdictions described enhanced hand hygiene (94%), enhanced cleaning procedures (69%, 31% not described), cohorting of students (75%, 25% not described), and physical distancing amongst staff (88%, 12% not described); mandatory face mask wear was reported for staff (75%, not required by 12.5% and not described by 12.5%) and students (81%, not required by 13% and not described by 6%).
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CHARACTERISTIC	SUMMARY
Reference	Office for National Statistics. COVID-19 Schools Infection Survey Round 1, England: November 2020. ONS; 2020.
Aims	<p>To investigate the prevalence of current coronavirus (COVID-19) infection and COVID-19 antibodies among pupils and staff in sampled primary and secondary schools in England, measured at half-termly intervals during the school year. In addition, it aims to examine the impact of attendance of pupils and staff, school implementation measures and outbreak investigations.</p> <p>The long-term aims of this study are to investigate the role of schools in COVID-19 transmission and explore how transmission within and from school settings can be minimised.</p>
Study design/setting	Repeated survey; this presents the first round i.e. baseline; 3 -19 November 2020
Population	Pupils and schools staff attending participating schools
Country	England
Method	<p>Recruitment: Schools were selected for inclusion using a multi-staged stratified random sampling scheme, with separate sampling frames for high and low COVID-19 prevalence level local authorities and for primary and secondary schools. Special schools, independent schools, pupil referral units and further education colleges and schools taking part in other school-based COVID-19 studies were excluded from the sampling frame.</p> <p>The aim of the study was to recruit 100 secondary schools and 50 primary schools across 15 local authorities. It also required a clustered sample of schools with approximately 70% (70 secondary and 35 primary) schools in high risk areas and 30% (30 secondary and 15 primary) in low risk areas.</p> <p>Within the selected schools, all staff were eligible in both primary and secondary schools to participate in the study. Similarly, within primary schools, all pupils were eligible to participate. However, because of the larger number of pupils in secondary schools, eligibility was restricted to two consecutive year groups in each secondary school.</p> <p>Method: A study team visited the school to collect biological samples for testing. Tests for students involved a nose swab for current COVID-19 infection, and an oral fluid (saliva)</p>

	<p>sample for antibodies against the virus. Tests for staff involved a nose swab for current COVID-19 infection and a finger prick blood test for antibodies against the virus. Everyone was offered testing regardless of whether they were experiencing COVID-19 symptoms. Additional online questionnaires will be sent to participants during the surveillance period. Analysis: This bulletin presents a summary of estimates. The data is unweighted</p>
Results	<p>In the first round of testing, 105 schools (63 secondary (60%) and 42 primary (40%) in 14 local authorities participated. Of the 14 local authorities, 9 (64.2%) were in high prevalence and 5 (35.8%) were in low prevalence areas. Within these schools, 11,194 participants (4,941 (44.1%) staff and 6,253 (55.9%) pupils) had enrolled by the test date.</p> <p>Among people attending school on the day of testing, 1.24% (95% confidence interval: 0.96% to 1.58%) of pupils (65 out of 5,235 tested) and 1.29% (95% confidence interval: 0.96% to 1.68%) of staff (53 out of 4,122 tested) tested positive for current infection. These differences are not statistically significant.</p> <p>For pupils, the percentage of primary school pupils testing positive for current infection was 0.89% (95% confidence interval: 0.54% to 1.39%). The percentage of secondary school pupils testing positive for current infection was 1.48% (95% confidence interval: 1.10% to 1.98%); 19 out of 2,136 primary pupils and 46 out of 3,099 secondary pupils tested positive.</p> <p>For school staff, the percentage of primary school staff testing positive for current infection was 0.75% (95% confidence interval: 0.32% to 1.47%). The percentage of secondary school staff testing positive for current infection was 1.47% (95% confidence interval: 1.08% to 1.97%); 8 out of 1,068 primary staff and 45 out of 3,054 secondary staff tested positive. These differences between pupils and staff and primary and secondary schools are not statistically significant.</p> <p>In secondary schools in high prevalence areas, 1.73% of pupils (95% confidence interval: 1.18% to 2.43%) and 1.62% of staff (95% confidence interval: 1.12% to 2.27%) tested positive for current infection (32 out of 1,853 pupils and 33 out of 2,035 staff). For secondary schools in low prevalence areas, the percentage testing positive was 1.12% for pupils (95% confidence interval: 0.62% to 1.88%) and 1.18% for staff (95% confidence interval: 0.61% to 2.05%); 14 out of 1,246 pupils and 12 out of 1,019 staff.</p>

Of those tested for current infection in 105 schools, 47 schools (44.76%) had no current infections, 29 (27.62%) had 1 current infection and 29 (27.62%) had between 2 and 5 current infections.

Almost half of schools enrolled in the first testing round (just under 50) returned the questionnaire providing data on the infection control implementation measures in place. The most implemented measures across primary and secondary schools include hand sanitizers, frequent hand washing and increased cleaning of frequently touched surfaces. The least implemented measure across primary and secondary schools is the wearing of masks or face coverings by students in the classroom.

**COVID-19 in Children and Young People:
Literature Scanning Report 8
(27.11.20-11.12.20)**

Research question

What is the current knowledge about Covid-19 and children and young people?

Method

The search strategy and inclusion/exclusion criteria are outlined in Appendix 1 (page 15). The titles and abstracts of 61 papers were screened against the agreed inclusion and exclusion criteria for possible inclusion in this report. This screening identified 40 papers for further consideration. The full text of each was assessed and 17 met the inclusion criteria. Details of the included studies can be found in Appendix 2 (page 17) and the excluded studies in Appendix 3 (page 59). In this report, references that are highlighted in **red font** are pre-print publications. Papers that might be of particular interest and/or to raise awareness to the advisory group are highlighted in **purple font** and listed on page 2. Hyperlinks to the original articles are included.

Key messages

- The evidence base about children and young people's role in the transmission of SARS-CoV-2 in household and community settings, including schools, continues to develop. For example, a study using data collected by Public Health England during the summer term (June – July 2020) found that outbreaks in educational settings were strongly associated with the community COVID-19 incidence.
- The impact of the pandemic and the public health control measures on children and young people's physical and mental health continue to be a field of considerable research activity. For example, in a qualitative study with parents of children about to start school, participants reported that during lockdown their child was snacking more and were physically less active. Some parents expressed concerns about the impact on their child's skills and confidence.
- A rapid review of international literature found mixed evidence about the direct impact of the pandemic and the associated social restrictions on intimate partner violence and child maltreatment. However, an increase in risk factors for violence such as substance misuse, parental and financial stress was reported by all the studies included in the review.

Reports of potential interest

Papers included in this report

- Ismail SA, Saliba V, Lopez Bernal J, Ramsay ME, Ladhani SN. SARS-CoV-2 infection and transmission in educational settings: a prospective, cross-sectional analysis of infection clusters and outbreaks in England. *Lancet Infect Dis* 2020. [doi:10.1016/S1473-3099\(20\)30882-3](https://doi.org/10.1016/S1473-3099(20)30882-3).

Papers not included in this report

The following studies and reports did not meet the inclusion criteria for this report. Nevertheless, they may be of interest to the advisory group.

Modelling studies

- Bershteyn A, Kim H-Y, McGillen J, Braithwaite RS. Which policies most effectively reduce SARS-CoV-2 transmission in schools? *MedRxiv* 2020. [doi:10.1101/2020.11.24.20237305](https://doi.org/10.1101/2020.11.24.20237305).

Estimated the impact of (1) infection control measures, (2) providing an option of all-remote instruction, (3) choice of class scheduling for in-person learners, (4) daily symptom screening, (5) testing to curtail transmission, and (6) testing to identify school outbreaks. Each policy was assessed independently of other policies, with the exception of symptom screening and random testing, which were assessed both independently and jointly.

- Kaiser AK, Kretschmer D, Leszczensky L. Social network-based strategies for classroom size reduction can help limit outbreaks of SARS-CoV-2 in high schools. A simulation study in classrooms of four European countries. *MedRxiv* 2020. [doi:10.1101/2020.11.30.20241166](https://doi.org/10.1101/2020.11.30.20241166).

Using nationally representative data on adolescents in classrooms in four European countries, the authors simulated how four different cohorting strategies can mitigate the spread of SARS-CoV-2 in high schools. The effect of forming two cohorts randomly, splitting cohorts by gender, and optimizing cohorts by minimizing students' out-of-school cross-cohort contacts, was modelled.

- Rozhnova G, van Dorp CH, Bruijning-Verhagen P, Bootsma MCJ, van de Wijgert JHHM, Bonten MJM, et al. Model-based evaluation of school- and non-school-related measures to control the COVID-19 pandemic. *MedRxiv* 2020. [doi:10.1101/2020.12.07.20245506](https://doi.org/10.1101/2020.12.07.20245506).

Using a transmission model, the authors estimated the impact of school contacts on transmission of SARS-CoV-2 and to assess the effects of school-based measures, including school closure, on controlling the pandemic at different time points during the pandemic.

- Yang J, Zhang Q, Cao Zhidong, Gao J, Pfeiffer D, Zhong L, et al. [The impact of non-pharmaceutical interventions on the prevention and control of COVID-19 in New York City. MedRxiv 2020. doi:10.1101/2020.12.01.20242347.](#)

Presents an age-specific susceptible-exposed-infected-recovery-death model that considers the unique characteristics of COVID-19 to examine the effectiveness of various non-pharmaceutical interventions (NPIs) in New York City (NYC).

Guidelines

- Lo Moro G, Sinigaglia T, Bert F, Savatteri A, Gualano MR, Siliquini R. [Reopening Schools during the COVID-19 Pandemic: Overview and Rapid Systematic Review of Guidelines and Recommendations on Preventive Measures and the Management of Cases.](#) Int J Environ Res Public Health 2020; 17. [Doi:10.3390/ijerph17238839.](#)

This overview describes the main measures planned for the 2020–2021 academic year within the WHO European Region.

- [Coronavirus \(COVID-19\) contingency framework for education and childcare settings - GOV.UK](#)
- [Education settings: coronavirus testing, contact tracing and NHS COVID-19 app guidance | GOV.WALES](#)

Other reports

- Hefferon C, Taylor C, Bennett D, Falconer C, Campbell M, Williams JG, et al. [Priorities for the child public health response to the COVID-19 pandemic recovery in England.](#) Arch Dis Child 2020:archdischild-2020-320214. [Doi: 10.1136/archdischild-2020-320214.](#)

In order to outline COVID-19 impacts on children's health in England, public health academics and local authority public health leads for children and young people hosted a workshop to identify impacts, which informed a targeted, but non-systematic, review of emerging literature between March and July 2020.

- Richardson D, Carraro A, Cebotari V, Gromada A (2020). [Supporting Families and Children beyond COVID-19: Social protection in high-income countries](#), *Innocenti Research Report* Florence: UNICEF Office of Research – Innocenti.
- [Decisions to allow all learners to return to schools and settings in September: impact assessment | GOV.WALES](#)
- Public Health Scotland. [The impact of COVID-19 on children and young people in Scotland: 2 to 4 year olds.](#) Edinburgh: Public Health Scotland; 2020.

One of a planned series of papers that will consider the possible positive and adverse consequences, of public health control measures implemented

during the pandemic, on children's and young people's development and wellbeing at different ages and stages of their lives.

Findings

The included studies can be categorised into four broad topic areas:

- a) Transmission (n=8)
- b) Health and wellbeing (n=6)
- c) Parents' perspectives (n=2)
- d) Child maltreatment(n=1)

Transmission

Eight studies that examined aspects of the role of children and young people in the transmission of SARS-CoV-2 met the inclusion criteria for this paper. There was one review of international research and seven individual studies from Germany (n=3), America (n=2), Poland (n=1) and England (n=1).

International review

In a meta-analysis of international studies, Zhu et al¹ looked at the prevalence of paediatric index cases in household transmission clusters of SARS-CoV-2 as well as the secondary attack rates of children and adults in the household clusters. In total, 57 papers describing 213 SARS-CoV-2 household transmission clusters met the inclusion criteria. In the clusters where a child was identified as an index case (n=8), sixteen secondary cases were found to be linked. Overall, there was insufficient case numbers to determine whether children were more or less likely to transmit SARS-CoV-2 in a household setting compared to adult index cases. In eleven observational studies of household transmission clusters, the secondary attack rate in tested paediatric household contacts (<18 years) was found to be statistically significantly lower than that in adult household contacts. These findings should be interpreted with a degree of caution as there was considerable heterogeneity between studies which brings the validity of the meta-analysis into question. In addition, there is information missing in this report. For example, it does not present information about the quality of the primary studies undertaken and the details of the studies that met the inclusion criteria are not given.

Germany

In one region of Germany, Armann et al² aimed to find out the proportion of secondary school pupils and their teachers who were seropositive for SARS-CoV-2 antibodies. Pupils (n=2,020) and teachers in thirteen secondary schools were invited to take part. Peripheral venous blood was collected from participants and tested for SARS-CoV-2 antibodies on two occasions; after school re-opening (May-June 2020) and, again, after the school summer break (September-October 2020). In addition, those taking part were asked about COVID-19 infections in themselves or their household contacts. A total of 2,045 individuals

(1,538 pupils and 507 teachers) agreed to take part and 1,779 (1,334 pupils and 445 teachers) took part at both time points.

At the first collection point, twelve participants (eleven pupils and one teacher) were found to be seropositive for SARS-CoV-2 antibodies (12/2045 \approx 0.6% seroprevalence). Similarly, at the follow-up, twelve participants (eleven pupils and one teacher) were again found to be seropositive (12/1779 \approx 0.7% seroprevalence). One participant who tested positive at the first time point was found to be negative at the second time point and another who had equivocal test results initially, tested positive at the second time point. Of participants with a household history of SARS-CoV-2 infection (n=24), only one individual was found to be seropositive. The seroprevalence of SARS-CoV-2 antibodies in this study sample was found to be broadly similar to the prevalence of PCR-confirmed cases (0.8%) in the local community. There is, however, information missing from this report. The data tables that are presented in this report are limited. No information is given about the mitigation measures in place in schools or the social restrictions in the local community during the study period

Hoehl et al³ evaluated the feasibility of self-testing of teachers for SARS-CoV-2 using a rapid antigen test in Germany. Primary and secondary school teachers (n=602, 86.7% response rate) in three school districts in one region were recruited to take part. They were asked to collect a nasal swab and perform a rapid antigen test every 48 hours during the study period (three weeks before autumn break and four weeks afterwards). Any samples that were determined by the individual to be positive were tested again in the laboratory using a SARS-CoV-2 RT-PCR test. At the end of the study, participants were asked to complete a questionnaire about any difficulties in the testing procedure and whether they had been diagnosed with a SARS-CoV-2 infection but tested negative on the rapid antigen test.

In total, 10,836 test results were recorded; 21 were determined to be positive. Of these, five were confirmed as positive by RT-PCR. Sixteen false positive antigen tests were reported (0.15% of all tests). There were four cases of false negative results from the rapid antigen test as these participants reported a positive RT-PCR sample during the time they were taking part in the study. However, not all the participants performed the test every 48 hours throughout the study period. There is no information in this report about the mitigation measures in place in the schools or the local social restrictions. The information is not differentiated between primary and secondary teachers.

Using a cross-sectional surveillance study, Thielecke et al⁴ assessed the prevalence of SARS-CoV-2 infections and IgG sero-reactivity among pre-school children, their household members and early year's staff connected with twelve kindergartens in Berlin at the beginning of October 2020. Nasal and oropharyngeal swabs were tested for SARS-CoV-2 infection by RT-PCR. Dried

capillary blood samples were tested for anti-SARS-CoV-2 IgG. In total, 720 individuals (155 pre-school children, 487 household members and 78 early years' staff) took part. Of 701 samples (from 152 children, 471 household members and 78 staff) tested, none were positive for SARS-CoV-2 infection. One childcare worker was positive for IgG antibodies. At the time of the study, the kindergartens taking part had a number of mitigation measures in place, including physical distancing between staff and parents and children being cared for in fixed groups. However, the findings should be treated with a degree of caution as there is information missing from this report. For example, the response rate is not stated and no socio-demographic information is included so it is not possible to tell if those taking part were representative of the wider population. Limited data tables are presented so it is difficult to judge the validity of the findings.

America

Using routinely collected data, Jones⁵ examined the trends of COVID-19 infection associated with K-12 schools in Florida between the beginning of August (when schools began to re-open for in-person teaching) and mid-November 2020. During the study period, 10,088 pupils and 4,507 staff had laboratory-confirmed COVID-19 recorded. Rates among school staff were higher than among pupils in all school environments apart from high schools. The state-wide incidence rate (cases per 1,000 pupils enrolled in face-to-face or hybrid instruction) was higher among high school students (12.5 per 1,000) than younger children (7.4 per 1,000). The staff cases rate in districts without mask mandates (29.2 per 1,000 on-campus employees) was nearly twice that of staff case rates in districts with mandatory mask policies (14.8 per 1,000). Between 3rd October and 14th November, the case rates for K-12 pupils was considerably higher than during the time period between 10th August and 3rd October. It rose from 2.3 cases per 1,000 in elementary school pupils and 4.5 per 1,000 high school students to 7.4 cases per 1,000 in elementary pupils and 12.5 per 1,000 high school students. However, the data tables that are presented in this report are limited so it is difficult to judge the validity of the findings. Potential confounders such the socio-demographics of the school districts do not appear to have been taken into account. In addition, there is no information given about mitigation measures in place in schools, in particular it is unclear whether mask mandates extended to school pupils while in school.

Pitmann-Hunt et al⁶ carried out a retrospective clinical record review of paediatric patients attending a single tertiary paediatric hospital in Detroit to describe transmission patterns of SARS-CoV-2 infection. In addition, a follow-up telephone survey was carried out six weeks after discharge to find out if household members had become sick subsequently. SARS-CoV-2 testing (either RT-PCR or serum antibody testing) was carried out in 1,264 children, of whom 71 (5.1%) tested positive. The majority were reported to be asymptomatic or have mild disease (n=39, 55%). In 30 of the 71 positive cases (42%), someone

who lived with the child had either tested positive for SARS-CoV-2 or had symptoms suggestive of COVID-19 at the time of the onset of the child's symptoms. No evidence of child-to-adult transmission was found. However, the data tables and analysis presented in this report are limited so it is not possible to judge the validity of the findings. In particular, the analysis does not differentiate between children who tested positive on RT-PCR and those who had positive antibody tests. It is not clear from this report what the hospital's testing policy was.

Poland

Using an online survey in April 2020, Skolmowska et al⁷ explored hand hygiene behaviours of adolescents (15-20 years) living in Poland. In addition to demographic information, students were asked questions about their hand hygiene behaviours. Pupils (n=2,323, 57.8% response rate) were recruited from 28 schools (4.3% response rate). After undergoing a randomised pair-match procedure to obtain a balance of girls and boys that was representative of the wider population, information from 1,222 adolescents was included in the analysis. Answers from students living in regions with 'high' numbers of COVID-19 with those living in 'low' regions were compared. In the areas, defined by the authors as having low COVID-19 morbidity, a greater proportion of respondents reported washing their hands before and after meals, before and after using the restroom, after handshaking and after blowing their nose compared to those living in regions with high COVID-19 morbidity. However, these findings should be interpreted with a degree of caution. The authors define regions as having low or high COVID-19 by case number count rather than cases per population. It is likely some regions will be more populous than others. This report presents a basic analysis which does not take account of potential confounding factors such as socio-economic status of the region, population density or age of the respondent. Apart from pupils learning at home following school closures, there is no information given about the public health control measures in place at the time of the survey and whether they differed between the regions.

England

In a prospective cross-sectional analysis of routine collected data, Ismail et al⁸ examined the rate of SARS-CoV-2 infection and outbreaks among staff and students (≤ 18 years) in educational settings in England during the summer half-term (June-July 2020). During this time period, there were 177 COVID-19 related events in educational settings; 113 single cases, nine co-primary cases and 55 outbreaks. Staff had a higher incidence than students. When the index case was a child, the maximum number of secondary cases was six (median = 1, IQR 1-2) compared to twelve secondary cases when the index case was a staff member (median = 1, IQR 1-5). The probable direction of transmission was staff-to-staff in 26 outbreaks, student-to-staff in sixteen outbreaks and student-to-student in five outbreaks. Outbreaks in educational settings was found to be strongly associated with community COVID-19 incidence with the risk of an

outbreak increasing by 72% for every five cases per 100,000 increase in community incidence ($p < 0.0001$). It should be noted that at the time of this study, schools were open to limited numbers of children with infection control measures, such as smaller classes forming distinct 'bubbles' that did not mix with other bubbles in the setting, physical distancing and enhanced handwashing, in place.

¹ Zhu Y, Bloxham CJ, Hulme KD, Sinclair JE, Tong ZWM, Steele LE, et al. A meta-analysis on the role of children in SARS-CoV-2 in household transmission clusters. *Clin Infect Dis* 2020. [doi:10.1093/cid/ciaa1825](https://doi.org/10.1093/cid/ciaa1825).

² Armann JP, Unrath M, Kirsten C, Lueck C, Dalpke A, Berner R. Anti-SARS-CoV-2 IgG antibodies in adolescent students and their teachers in Saxony, Germany (SchoolCoviDD19): very low seroprevalence and transmission rates. *MedRxiv* 2020. [doi:10.1101/2020.07.16.20155143](https://doi.org/10.1101/2020.07.16.20155143).

³ Hoehl S, Schenk B, Rudych O, Göttig S, Foppa I, Kohmer N, et al. At-home self-testing of teachers with a SARS-CoV-2 rapid antigen test to reduce potential transmissions in schools. *MedRxiv* 2020. [doi:10.1101/2020.12.04.20243410](https://doi.org/10.1101/2020.12.04.20243410).

⁴ Thielecke M, Theuring S, van Loon W, Hommes F, Mall MA, Rosen A, et al. SARS-CoV-2 infections in kindergartens and associated households at the start of the second wave in Berlin, Germany – a cross sectional study. *MedRxiv* 2020. [doi:10.1101/2020.12.08.20245910](https://doi.org/10.1101/2020.12.08.20245910).

⁵ Jones RD. COVID-19 Trends in Florida K-12 Schools, August 10 - November 14, 2020. *MedRxiv* 2020. [doi:10.1101/2020.11.30.20241224](https://doi.org/10.1101/2020.11.30.20241224).

⁶ Pitman-Hunt C, Leja J, Jiwani ZM, Rondot D, Ang J, Kannikeswaran N. SARS-CoV-2 Transmission in an Urban Community: The Role of Children and Household Contacts. *J Pediatric Infect Dis Soc* 2020. [doi:10.1093/jpids/piaa158](https://doi.org/10.1093/jpids/piaa158).

⁷ Skolmowska D, Głabska D, Guzek D. Hand Hygiene Behaviors in a Representative Sample of Polish Adolescents in Regions Stratified by COVID-19 Morbidity and by Confounding Variables (PLACE-19 Study): Is There Any Association? *Pathogens* 2020; 9. [Doi: 10.3390/pathogens9121011](https://doi.org/10.3390/pathogens9121011).

⁸ Ismail SA, Saliba V, Lopez Bernal J, Ramsay ME, Ladhani SN. SARS-CoV-2 infection and transmission in educational settings: a prospective, cross-sectional analysis of infection clusters and outbreaks in England. *Lancet Infect Dis* 2020. [Doi: 10.1016/S1473-3099\(20\)30882-3](https://doi.org/10.1016/S1473-3099(20)30882-3).

Health and wellbeing

There were six reports that examined aspects of children's health and wellbeing that met the inclusion criteria. Three reports focused on mental health and wellbeing and three examine elements of physical health.

Mental health and wellbeing

England

In England, parents of children* who had taken part in the Resilience in Education and Development study in 2018/9 were contacted during lockdown (end April to mid-June) to assess if there had been changes in emotional

* Age at baseline 2018/9 8-9 years.

wellbeing*, anxiety and depression†, measured by sub-scales of two standardised questionnaires.⁹ Caregivers who had completed the questionnaires at baseline and at the second time point were included in the analysis (n=168, 29% response). It was found that, compared to baseline, there were non-significant decreases in emotional problems and anxiety. The proportion of children with emotional problem scores in the elevated range decreased from 13% (19 children) to 8% (12 children). On the other hand, depression scores were, on average, higher. However, these findings should be interpreted with a degree of caution for a number of reasons. There was a low response rate at the second data collection point. It is not possible to tell from this report if those taking part were representative of the original sample or the wider population. The majority of participants at the lockdown collection point were home owners (70%, n=117) and/or were educated to at least degree level (59%, n=99). At baseline, the anxiety and depression measures was completed by the children along with a small sub-group of caregivers. In contrast, at the second data collection point, they were completed by caregivers only.

Italy and Spain

Parents/caregivers of children (3-18 years) living in Italy and Spain were recruited through social networks to complete a bespoke questionnaire about the emotional impact of the lockdown measures on their child.¹⁰ The majority (85%, n=980) of respondents (n=1,143) reported that they had noticed changes in their child, such as having more difficulty concentrating, being more irritable, restless, nervous, worried or anxious. Parents reported that screen-time for their child had increased, while less time was spent being physically active. About a third of parents (35.4%) reported that they were feeling stressed or very stressed. Parents who reported that they were stressed tended to report more emotional impacts on their children than other parents. However, the findings should be interpreted with a degree of caution as the recruitment process introduces a potential source of bias. The majority of care givers (61.9%) were at least college educated. Only 5% reported that they had lost their job due to the pandemic. As the findings were not differentiated by age of the child, it is not possible to tell if younger or older children were affected similarly. This study was carried out 15 days after the first lockdown of the pandemic was imposed in Italy and Spain, which means it reports only the initial emotional impacts on children and young people as observed by their parents/caregivers.

America

Students in three US high schools were invited to take part in an online survey to find out about the biggest challenges they faced during school closures and

* Measured using emotional problems subscale of Strengths and Difficulties Questionnaire

† Measured using Revised Children's Anxiety and Depression Scale (RCADS) – short form subscales for anxiety and depression

the public health restrictions implemented to prevent the spread of SARS-COV-2.¹¹ Information from students* (n=719) who completed at least one demographic question as well as an open-end question about their three biggest challenges are presented in this report. Overall, 14 categories of challenges were identified including challenges with online learning, mental and physical health, friends, family, general social interaction, adjusting to quarantine rules, uncertainty about the future, missing key events and worry about exposure or contraction of COVID for themselves or their family members. Older students reported more concerns about the future than younger pupils, while friends were more of a challenge for the younger age group. Students who identified as male reported the most challenges about their education and the future, whereas female students reported the most challenges with friends and family. Gender minority students reported more challenges with mental and physical health and social connection but less challenges with family and friends. It is not clear from this report what proportion of students who were eligible to take part responded; 1,125 students were reported to have started the survey. It is not possible to tell if those taking part were representative of the wider population.

Physical health

England

Clarke et al¹² carried out qualitative interviews[†] with parents of children (3-5 years), who were due to start school in September 2020, focussing on physical activity, sedentary behaviour, food intake and sleep. Parents (n=20) were recruited through nurseries and Facebook community groups in the South West and West Midlands of England. Parents reported that during the first COVID-19 lockdown that their children snacked more, had more screen time, sleep issues had increased and that they were less physically active. Although some parents expressed concerns about the future impact of negative behaviour changes, most believed that the changes were a temporary consequence of a lack of routine. Some parents expressed concerns about the impact of lockdown on their child's skills and confidence. It is not known if the views expressed by those taking part were representative of the wider population; 65% (n=13) of participants were educated to at least degree level.

Italy

Adolescents (15-18 years) attending high schools in one region of Italy were surveyed on three occasions; at the end of January 2020 before lockdown, March-April during the lock down measures and in May when measures had started to be lifted.¹³ Those taking part were asked to complete the online version of the International Physical Activity Questionnaire to assess how physical activity patterns were impacted by the public health restrictions. The proportion of adolescents who were inactive rose from 17.8% (n=154) prior to

* Median age 15.28 years; range 14-19 years

† By telephone or video call

lockdown to 25.8% (n=102) during lockdown before reducing again to 18.5% (n=53) post-lockdown. The proportion of adolescents who reported being very active increased from 15.8% (n=137) to 19.8% (n=79) during lockdown and 19.9% (n=57) post-lockdown. Prior to lockdown, only 5.9% (n=51) of adolescents reported that they were active in line with the WHO recommendations for physical activity in this age group. This increased to 13.6% (n=39) post-lockdown. However, the number of responses at the third data collection point (n=287) was about a third of the number of adolescents who responded to the first survey (n=864). It is not clear from this report if changes in an individual's physical activity levels were tracked overtime. The analysis does not seem to take account of baseline physical activity. No sociodemographic information is reported which means that it is not possible to tell if those taking part were representative of the wider population.

Ireland

Using an online survey distributed to adolescents who were pupils of six schools taking part in the Active School Flag initiative in Ireland, Ng et al investigated changes in physical activity during school closures in the first lockdown.¹⁴ In total, 1,551 young people (33% response rate) took part, with complete responses received from 1,214 (26% response rate). Along with a questionnaire about their physical activity during the previous seven-day period, participants who indicated that their physical activity had changed from their 'usual', were asked why the past week had been unusual. Overall, half of respondents (49.7%) reported that they were doing less physical activity during the lockdown period, while one in five (19.1%) reported they did more. Adolescents who were overweight or obese were more likely than those of normal weight to report less physical activity during lockdown. Females were less likely to report the same levels of physical activity as usual during lockdown than males. Open-ended responses (n=947) about why the past week had been unusual identified a number of barriers and facilitators to physical activity. COVID-19 and its associated restrictions, time and having no school were seen as both a barrier and a facilitator for physical activity. There is, however, no socio-demographic information given in this report which means it is not possible to tell how representative of the wider population those taking part were.

⁹ Bignardi G, Dalmaijer ES, Anwyl-Irvine AL, Smith TA, Siugzdaite R, Uh S, et al. Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. *Arch Dis Child* 2020: archdischild-2020-320372. [Doi: 10.1136/archdischild-2020-320372](https://doi.org/10.1136/archdischild-2020-320372).

¹⁰ Orgilés M, Morales A, Delvecchio E, Mazzeschi C, Espada JP. Immediate Psychological Effects of the COVID-19 Quarantine in Youth from Italy and Spain. *Front Psychol* 2020; 11:579038. [doi:10.3389/fpsyg.2020.579038](https://doi.org/10.3389/fpsyg.2020.579038).

¹¹ Scott SR, Rivera KM, Rushing E, Manczak EM, Rozek CS, and Doom JR. "I Hate This": A Qualitative Analysis of Adolescents' Self-Reported Challenges during the COVID-19 Pandemic. *J Adolesc Health* 2020. [doi:10.1016/j.jadohealth.2020.11.010](https://doi.org/10.1016/j.jadohealth.2020.11.010).

¹² Clarke JL, Kipping R, Chambers S, Willis K, Taylor H, Brophy R, et al. Impact of COVID-19 restrictions on pre-school children's eating, activity and sleep behaviours: a qualitative study. *MedRxiv* 2020. [doi:10.1101/2020.12.01.20241612](https://doi.org/10.1101/2020.12.01.20241612).

¹³ Tornaghi M, Lovecchio N, Vandoni M, Chirico A, Codella R. Physical activity levels across COVID-19 outbreak in youngsters of Northwestern Lombardy. *J Sports Med Phys Fitness* 2020. [doi:10.23736/S0022-4707.20.11600-1](https://doi.org/10.23736/S0022-4707.20.11600-1).

¹⁴ Ng K, Cooper J, McHale F, Clifford J, Woods C. Barriers and facilitators to changes in adolescent physical activity during COVID-19. *BMJ Open Sport Exerc Med* 2020; 6:e000919. [Doi: 10.1136/bmjsem-2020-000919](https://doi.org/10.1136/bmjsem-2020-000919).

Parents' perspectives

Two studies that explored parents' views about their child returning to in-person teaching in schools in America met the inclusion criteria for this current paper.

America

Parents/guardians of children attending public schools in three states of America were recruited from a volunteer panel to take part in an online survey to determine factors associated with their plans for their child to attend school in-person in the school year 2020-21.¹⁵ In total, 1,193 parents/care-givers took part; information about 2,202 children was included in the child-level analysis and 1,126 respondents were included in the respondent level analysis. The majority of parents (71%, n=1,563) reported that they planned that their child would attend school in-person. This proportion was higher for children of White/non-Hispanic respondents (75.5%) than for children of non-White respondents (54.1-65.5%). For children living in households with lower annual incomes (\$0-49,999), in-person school attendance was planned for 65.7% compared to 79.3% of children in a household with the highest income level (≥\$100,000). Factors associated with a lower probability of plans for in-person school attendance included presence of a perceived high risk health condition, employment status of stay-at-home parent/guardian, respondent age greater than 55 years and being very concerned about the impact of COVID-19 on the family's financial wellbeing. Factors associated with a high probability of plans for in-person school attendance included the presence of an individualised education plan.

Respondents were also asked to indicate their support for a number of risk mitigation measures which focused on limiting contact between students, testing and screening for COVID-19 and mandatory face coverings. The measures with the lowest support and highest opposition were those that suggested stopping extracurricular programmes and closing playground structures. The measure with highest support and lowest opposition was daily temperature screening of students. Support for mandatory face coverings was higher for school staff and older students than for younger pupils.

These findings should be interpreted, however, with a degree of caution as the recruitment process introduced a potential source of bias. Compared to parents and guardians of school-aged children who took part in 2018 American Community survey in the three states, respondents were more likely to be aged 18-44 years, identify as White/non-Hispanic and have an annual household income \$50,000-\$99,000.

Gilbert et al¹⁶ examined differences in parental attitudes and concerns about school re-opening during the pandemic. Data from three online national surveys conducted among adults aged over 18 years was analysed. Respondents were asked about their attitudes and concerns about school re-opening. In total, information from 858 parents with school-aged children living in the household was included. Overall, 56.5% of parents strongly or somewhat agreed that schools should re-open in-person at the beginning of the school year. A lower proportion of Black (46%) and Hispanic (50.2%) parents strongly or somewhat agreed compared to White parents (62.3%). The majority of parents (89.4%) were concerned about the quality of their children's education being negatively affected by the COVID-19 pandemic. Overall, most parents were very or somewhat concerned about their child contracting COVID-19 (86.3%) or bringing COVID-19 home as a result of attending school. Although most parents supported mask mandates, a fewer White parents (62.5%) were supportive of a mask mandate for students and staff members than Hispanic parents (79.5%) or parents of other racial/ethnic groups (66.9%). The recruitment process, however, introduces a potential source of bias and the survey was administered in the English language only. There is no information about the community prevalence of the virus which may have shaped attitudes.

¹⁵ Chua K-P, DeJonckheere M, Reeves SL, Tribble AC, Prosser LA. Factors Associated with School Attendance Plans and Support for COVID-19 Risk Mitigation Measures Among Parents and Guardians. *Acad Pediatr* 2020. [doi:10.1016/j.acap.2020.11.017](https://doi.org/10.1016/j.acap.2020.11.017).

¹⁶ Gilbert LK, Strine TW, Szucs LE, Crawford TN, Parks SE, Barradas DT, et al. Racial and Ethnic Differences in Parental Attitudes and Concerns About School Reopening During the COVID-19 Pandemic — United States, July 2020. *MMWR Morb Mortal Wkly Rep* 2020; 69:1848–52. [doi:10.15585/mmwr.mm6949a2](https://doi.org/10.15585/mmwr.mm6949a2).

Child maltreatment

International review

In a rapid review of international literature, Gunn et al¹⁷ examined the impact of the COVID-19 pandemic and the associated public health restrictions on outcomes and risk factors related to intimate partner violence and child maltreatment. In total, 25 publications met the inclusion criteria; one systematic review and 24 non-randomised studies. In the main, it was found that the impact of the pandemic and the associated public health restrictions on outcomes related to intimate partner violence and child maltreatment was inconsistent. For example, one publication found evidence suggesting an increase in child maltreatment and three reports found evidence suggesting a

decrease. However, all the studies that looked at the impact of the pandemic on risk factors for violence, such as substance misuse, parental stress and financial stress, reported an increased in the factors assessed. Four studies reported about difficulties in the provision of and access to a range of support services.

¹⁷ Gunn H, McCormack S. COVID - 19: [Impact on Intimate Partner Violence and Child Maltreatment: A summary of evidence](#). Ottawa: CADTH; 2020.

APPENDIX 1: Method*

Search terms

- #1. coronavirus or corona virus or ncov* or covid* or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19
- #2. Child* or adolescen* or teen* or young person or young people or pupil*
- #3. Early years or childcare or nurser* or preschool* or pre-school* or kindergarten* or daycare or day care or school* or educational establishment* or "place of education" or special educational needs or (education* AND setting*) or teacher
- #4. #2 OR #3
- #5. #1 AND #4

Sources[†]

- Medline
- Embase
- LitCovid
- MedRxiv
- Proquest Coronavirus Research Database
- Proquest databases (Public Health, ASSIA, Sociological Abstracts)
- Don't forget the Bubbles
- Covid-19 Evidence Reviews (VA Syntheses Program)
- WHO Global literature on coronavirus disease – now incorporating CDC Covid-19 Research Articles Database
- UNICEF website
- UNICEF Children & COVID-19 Research Library
- Oxford COVID-19 Evidence Service
- RCPCH COVID-19 Research Evidence Summaries
- Evidence Aid
- HIQA Ireland Evidence Summaries
- HIQA Ireland Database of Public Health Guidance on COVID-19
- Scottish Government publications
- PHE COVID-19 Literature Digest
- CDC Morbidity & Mortality Weekly Report
- Google Advanced Search

* With thanks to Seona Hamilton, Public Health Librarian, Public Health Scotland

† The sources were updated from 23rd October to reflect changes in the online databases.

Inclusion criteria

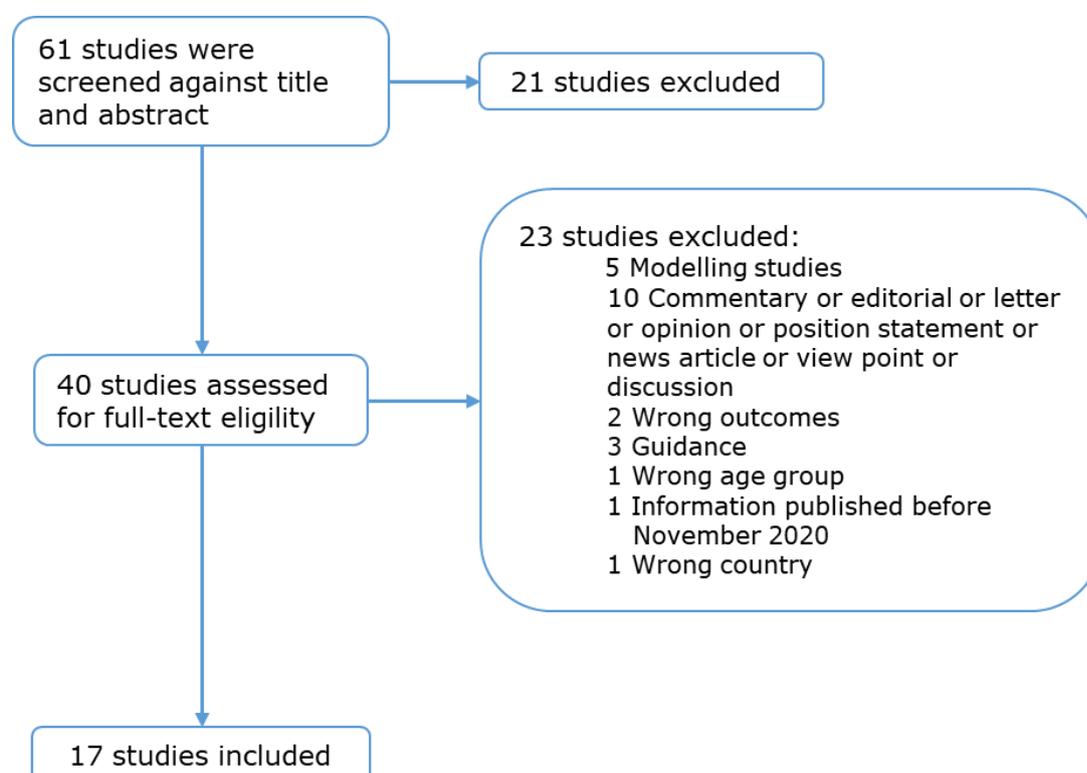
- Studies undertaken in Europe, North America, New Zealand or Australia
- Studies that report outcomes related to children and young people up to age 18 years living in community settings
- Studies that report transmission of COVID-19 in settings relevant to early learning and childcare, primary or secondary level schools
- Published in English
- Published or updated 27th November – 11th December.

Exclusion criteria

- Studies relating to further or higher education settings
- Papers that report modelling studies
- Studies that examine the clinical manifestations, diagnosis or treatment of Covid-19 in a paediatric population
- Articles which are commentaries, editorials, position statements, letters, news articles, discussion or opinion pieces
- Guidelines for schools or 'hints and tips' for teachers
- Study protocols

Selection process

The titles and abstracts were screened for potential inclusion using the agreed inclusion/exclusion criteria. The full text of each potential paper was then assessed for inclusion. The progress of the papers through the selection process is summarised in the diagram below.



Appendix 2: Included studies

Transmission

CHARACTERISTIC	SUMMARY
Reference	Armann JP, Unrath M, Kirsten C, Lueck C, Dalpke A, Berner R. Anti-SARS-CoV-2 IgG antibodies in adolescent students and their teachers in Saxony, Germany (SchoolCoviDD19): very low seroprevalence and transmission rates. <i>MedRxiv</i> 2020. doi:10.1101/2020.07.16.20155143.
Aims	To quantify the proportion of adolescent schoolchildren and teachers in Saxony that already have developed antibodies against SARS-CoV-2
Study design/setting	Repeated cross-sectional; 25 th May-30 th June and 15 th September-13 th October; Schools re-opened on 18 th May.
Population	Pupils (grades 8-11*) and teachers attending 13 secondary schools
Country	Germany
Method	<p>Recruitment: 2020 students and their teachers in 13 secondary schools were invited to participate in the SchoolCoviDD19 study.</p> <p>Measures: peripheral venous blood were collected from each individual during visits at each participating school between May 25th and June 30th, 2020. In addition, participants were asked to complete a questionnaire about their age, household size, previously diagnosed SARS-CoV-2 infections in themselves or their household contacts, comorbidities and regular medication. Students were also asked about regular social contacts outside their household or classroom. A second visit and repeat blood sampling took place between September 15th and October 13th 2020.</p>

* Approximately ages 14-16/17 years

	<p>All samples with a positive or equivocal LIAISON® test result, as well as all samples from participants with a reported personal or household history of a SARS-CoV-2 infection, were re-tested with two additional serological tests. Participants whose positive or equivocal LIAISON® test result could be confirmed by a positive test result in at least one additional serological test were considered having antibodies against SARS-CoV2.</p> <p>Analysis: Results for continuous variables are presented as medians with interquartile ranges (IQR) and categorical variables as numbers with percentages.</p>
Results	<p>A total of 1538 students and 507 teachers from 13 different schools participated in the first visit of the study, 1334 students and 445 teachers completed the second visit.</p> <p>Seroprevalence of SARS-CoV-2 antibodies was 0.6% (12/2045) at the initial visit (May/June) with twelve participants—eleven students and one teacher—having detectable antibodies against SARSCoV-2 in at least two different assays and thus being considered seropositive. At the follow-up visit (September/October), seroprevalence was 0.7% (12/1779) with eleven seropositive students and one teacher. One participant who tested positive in the initial sample was no longer positive at the second timepoint and one participant who had equivocal results initially tested positive 3 months later.</p> <p>In 7 out of 13 schools, seropositive participants could be identified, with four seropositive participants in one school as the maximum.</p> <p>Of the few participants with a personal history of a SARS-CoV-2 infection, 4/5 were seropositive, with the fifth showing only an equivocal test result in one of the assays. Of all participants with a household history of a SARS-CoV-2 infection, 23/24 were seronegative, with 22/24 showing negative results in all three assays and one showing an equivocal result in only one assay.</p> <p>Local surveillance data suggested a prevalence of PCR-confirmed cases of 0.8%.</p>
Comments	<p>Limited data tables included. No information is given about what mitigations were in place in schools or social restrictions in the local communities. During the study period, laboratory-confirmed SARS-CoV-2 infections per 100,000 inhabitants in Saxony increased from 139 to 245.</p>

CHARACTERISTIC	SUMMARY
Reference	Hoehl S, Schenk B, Rudych O, Göttig S, Foppa I, Kohmer N, et al. At-home self-testing of teachers with a SARS-CoV-2 rapid antigen test to reduce potential transmissions in schools. MedRxiv 2020. doi:10.1101/2020.12.04.20243410.
Aims	To evaluate the practical application of self-performed high frequency antigen test in a school setting
Study design/setting	Cross-sectional; Carried out over seven weeks: three were before and four were after a two-week autumn vacation (September 14th to October 4th and October 17th to November 15th, 2020).
Population	Primary and secondary teachers in three school districts in Hesse, Germany
Country	Germany
Method	<p>Recruitment: Teachers from primary and secondary schools in three school districts were invited by the Hessian Ministry of Education to participate in the study</p> <p>Measures: Study participants received written instructions, as well as an instructional video on how to collect an anterior nasal swab, and step-by-step instruction to perform and read a Rapid Antigen Test (RAT). Participants were asked to carry out the test every 48 hours during the study period. When a sample was deemed or suspected to be positive by the study participant, the sample medium from which material was inserted into the antigen test was collected. In the laboratory, a SARS-CoV-2 RT-PCR test was performed. At the end of the study, all participants completed a questionnaire to determine whether they encountered any difficulty in the testing procedure, and to record whether they were diagnosed with a SARS-CoV-2 infection but were tested negative with the RAT. When a study participant was quarantined due to exposure to SARS-CoV-2, positive test results were not evaluated. When a positive antigen test was recorded, either true or false, no further RAT tests were analysed from the respective study participant.</p>

<p>Results</p>	<p>A total of 602 teachers (86.7% response) from 85 schools provided records from the RATs. The age range was 21 to 67 years. A total of 10,836 tests were recorded (mean: 18 tests per study participant). 10,768 of these tests (99.37%) were recorded to have been valid and negative, 47 (0.43%) were recorded as invalid and 21 (0.19%) as positive (either true or false).</p> <p>A true positive antigen test result was confirmed by RT-PCR in five teachers during the study period. A prior or ongoing infection with SARS-CoV-2 was not known in any of these participants at the time of the antigen test. All five true positive cases occurred when the local 7-day incidence in the school district was higher than 100 cases / 100,000 inhabitants (mean 7-day incidence at the time of true positive test result: 252.66 cases / 100,000 inhabitants). At the time of testing, four of them were symptomatic, and one was pre-symptomatic. No asymptomatic infection with SARS-CoV-2 was detected.</p> <p>In 16 cases, a positive RAT result was determined by the study participant but could not be confirmed by RT-PCR. 13 of these tests were conducted when the 7-day local incidence was below 40 cases /100,000 inhabitants, and three occurred with a 7-day local incidence between 171 and 213 cases /100,000 inhabitants. 12 of the 16 false positive tests occurred while the study participant was asymptomatic, and four while symptoms were reported by the study participant. In 10 of these 16 cases, the false positive result occurred in the very first test the teacher performed.</p> <p>For four teachers, a false negative result in the antigen test was assumed, as they reported to have received a positive test result by SARS-CoV-2 PCR from a swab that had been collected by a medical professional during the time of high-frequency self-testing with the RAT. Three of these events occurred during high incidence of SARS-CoV-2 (171, 213 and 253 cases/100,000 inhabitants, respectively). For one case it was not reported when the false negative test occurred, or if symptoms were present. In one case, the RAT later was positive seven days after the RT-PCR result.</p> <p>The 7-day local incidence of SARS-CoV-2 infections in the general population was 9 to 348 cases per 100,000 inhabitants during the study period.</p>
<p>Comments</p>	<p>Not all teachers at the schools that participated in the study performed the test every 48 hours throughout the entire study period, and not all teachers from the schools</p>

	participated in the study. No students from these schools were tested, and transmissions in the participating schools were not examined. There is no information about what mitigation measures in school or the social restrictions in place in the local communities were in place at the time of the study. The information is not differentiated by primary vs secondary teachers.
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CHARACTERISTIC	SUMMARY
Reference	Ismail SA, Saliba V, Lopez Bernal J, Ramsay ME, Ladhani SN. SARS-CoV-2 infection and transmission in educational settings: a prospective, cross-sectional analysis of infection clusters and outbreaks in England. Lancet Infect Dis 2020. doi:10.1016/S1473-3099(20)30882-3.
Aims	To estimate the rate of SARS-CoV-2 infection and outbreaks among staff and students in educational settings during the summer half-term (June–July, 2020) in England.
Study design/setting	Prospective cross-sectional analysis of routinely collected data; educational settings re-opened on June 1, 2020, starting with nurseries and preschools, reception, and year 1 and year 6 students, and extending to years 10 and 12 in secondary schools from June 15, 2020. Strict infection control measures, including smaller classes separated into distinct social bubbles that do not mix with other bubbles in the setting, physical distancing, and frequent handwashing were implemented
Population	Teachers and students (≤ 18 years)
Country	England
Method	Educational institutions are required to inform their local PHE Health Protection Team when they suspect or identify a case or outbreak of COVID-19. The events are recorded on HPZone, an online national database for recording events that require public health management. PHE held daily national meetings to discuss situations of interest across England, including educational settings. A risk assessment was done and a decision for

	<p>extensive testing made on a case-by-case basis, with particular focus on situations where wider transmission might have occurred.</p> <p>Individuals with confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (SARS-CoV-2 RT-PCR positive on an upper respiratory tract sample) were included in this analysis if they had physically attended their educational setting during their infectious period, which was defined as from 48 h before symptom onset to 10 days after symptom onset.</p> <p>For outbreaks, direction of transmission from the index case to secondary cases was inferred on the basis of the date of symptom onset for symptomatic individuals and date of testing for asymptomatic individuals.</p> <p>Calculated rates did not include children of key workers or vulnerable children who attended school but were not part of the year groups returning to school in June, 2020</p> <p>Staff attendance was only available for primary and secondary schools and did not distinguish between student-facing or other staff, so aggregated case rates across primary and secondary school settings were calculated.</p> <p>SARS-CoV-2 event rates and case rates were calculated for staff and children attending an educational setting, irrespective of whether the infection was acquired within or outside the educational setting.</p> <p>Negative binomial regression was used to correlate out breaks with regional population, population density, and community COVID-19 incidence, producing rate ratios.</p>
Results	<p>During the summer half-term, a median of 38,000 early years settings (IQR 35,500–41,500), 15,600 primary schools (13,450–17,300), and 4,000 secondary schools (3,700–4,200) were open each day, with a median daily attendance of 928,000 students (630,000–1,230,000) overall. Between June 1 and Aug 2, 2020 (weeks 23–31 of 2020), there were 45,778 laboratory-confirmed COVID-19 cases. 5,038 (11%) of whom were aged 0–18 years. In this age group, the national COVID-19 case rate rose from 3.8 cases per 100,000 population in week 23 to 5.6 cases per 100 000 population in week 31, with most of the increase occurring after June. PHE received 327 reports of COVID-19 related</p>

	<p>events in educational settings in England during the summer half-term; 177 were included in this detailed analysis</p> <p>There were 113 single cases of SARS-CoV-2 infection, nine co-primary cases, and 55 outbreaks. The risk of an outbreak increased by 72% (95% CI 28–130) for every five cases per 100,000 population increase in community incidence ($p < 0.0001$). Staff had higher incidence than students (27 cases [95% CI 23–32] per 100,000 per day among staff compared with 18 cases [14–24] in early years students, 6.0 cases [4.3–8.2] in primary schools students, and 6.8 cases [2.7–14] in secondary school students), and most cases linked to outbreaks were in staff members (154 [73%] staff vs 56 [27%] children of 210 total cases).</p> <p>When the index case was a child, the maximum number of secondary cases was six (median one case [1–2]) compared with 12 secondary cases (median one case [1–5]) when the index case was a staff member.</p> <p>Probable direction of transmission was staff to staff in 26 outbreaks, staff to student in eight outbreaks, student to staff in 16 outbreaks, and student to student in five outbreaks. The median number of secondary cases in outbreaks was one (IQR 1–2) for student index cases and one (1–5) for staff index cases.</p>
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CHARACTERISTIC	SUMMARY
Reference	Jones RD. COVID-19 Trends in Florida K-12 Schools, August 10 - November 14, 2020. MedRxiv 2020. doi:10.1101/2020.11.30.20241224.
Aims	To examine the extent to which COVID-19 has been detected and reported in schools through reporting of cases by day, by school level, by location, for both students and staff
Study design/setting	Analysis of routinely collected data; Florida; 10 th August – 14 th November, 2020; schools began to open to in-person teaching in August.
Population	Students and staff in K-12 schools

Country	US
Method	<p>Laboratory-confirmed cases of COVID-19 reported by either the Florida Department of Health, or directly from the 43 independently-reporting school districts in the state.</p> <p>School case data, collected daily, and school enrolment data for both in-person (including hybrid) and virtual learning were obtained by public records request to each of Florida's 67 districts for each week of the study period.</p> <p>Data regarding mask policies were obtained either from each district's reopening plan, or from public records request.</p> <p>County COVID-19 case rates were calculated based on new cases over a 14-day period at a rate per 1,000 people based on data reported by the Florida Department of Health.</p>
Results	<p>10,088 students and 4,507 staff in K-12 schools during the study period tested positive for COVID-19. Staff rates were higher than student rates in all school environments except high schools.</p> <p>The state-wide incidence rate (cases per 1,000 students enrolled in face-to-face or hybrid instruction) in Florida high school students (12.5) was 70% higher than younger cohorts (7.4).</p> <p>Approximately 61% of all students in Florida returned to in-person instruction during the report period, with 39% enrolled in virtual-learning programs. Most students (87%) in the state who attended in-person classes were enrolled in districts with mandatory mask mandates, but the percent of students enrolled in face-to-face instruction was highest among districts without mask mandates.</p> <p>The state-wide case incidence rate in districts without mask mandates (12.7 per 1,000 students enrolled face-to-face or hybrid) was 38% higher than those who attended in-person within districts that did have mask mandates (9.2).</p> <p>The staff case rate in districts without mask mandates (29.2 per 1,000 on-campus employees) was nearly twice that of staff case rates in districts with mandatory mask policies (14.8).</p>

	Case rates nearly tripled in the period October 3 – November 14 for students in Florida compared to the period August 10 – October 3 (4.5 per 1,000 in high school and 2.3 per 1,000 in elementary students to 12.5 and 7.4 per 1,000, respectively)
Comments	Data tables are quite limited. No information about socio-demographics of the different school districts. No information about the mitigations measures in schools – unclear if the mask mandate extended to school pupils in/out of school or to school staff in school.

CHARACTERISTIC	SUMMARY
Reference	Pitman-Hunt C, Leja J, Jiwani ZM, Rondot D, Ang J, Kannikeswaran N. SARS-CoV-2 Transmission in an Urban Community: The Role of Children and Household Contacts. J Pediatric Infect Dis Soc 2020. doi:10.1093/jpids/piaa158.
Aims	To describe transmission patterns of SARS-CoV-2 infection among households in a paediatric population in Detroit, Michigan
Study design/setting	Retrospective clinical record review and follow-up telephone call; single centre tertiary paediatric hospital; 12 th March - 15 th June, 2020
Population	Paediatric patients attending a tertiary paediatric hospital
Country	US
Method	All paediatric patients who tested positive for SARS-CoV-2 via nasopharyngeal swab during the study period using a PCR assay or serum antibody testing were identified. A retrospective clinical record review was conducted and the presence or absence of a sick contact was identified in either the emergency department note or the admission history and physical. From the electronic medical record, patient demographics, presenting symptoms, presence of household sick contacts was extracted. A household sick contact (HHSC) was defined as someone who lived with the child that either tested positive for SARS-CoV-2 or had symptoms suggestive of COVID-19 including fever, cough, congestion, sore throat, and diarrhoea. A follow-up phone call survey was conducted and patients were

	interviewed six weeks after hospital discharge to identify subsequent sick contacts and determine the timing of sick contacts in relation to the study patient's symptoms.
Results	<p>SARS-CoV-2 testing was performed in 1264 children, of whom 71 (5.1%) tested positive. When race was reported, 85% of the patient sample identified as African American. Though the majority (55%, n=39) of children were either asymptomatic* or had mild disease†, 83% (n=59) were hospitalized and 22.5% (n=16) [severe 6% (n=4) and critical 17%, (n=12)] had significant illness.</p> <p>Among the 71 children, only 30 (42%) identified a HHSC prior to the onset of the study patient's symptoms. Of the 30 households with sick contacts present, 25 households had a contact that tested positive for SARS-CoV-2 (83%), the remaining five households had HHSCs that were identified based on symptoms alone. In all cases where a HHSC was identified, there was no evidence of child-to-adult transmission, and only one case of child-to-child transmission from 3 and 6-year-old siblings to a 47-day old infant. A parent (23/30; 76%) was the most common index HHSC.</p>
Comments	Does not differentiate in the analysis between children who had tested positive on PCR testing and on serum antibody testing. No information given about the testing policy. It is not clear from this report why a number of children who were reported to be asymptomatic or have mild disease required hospitalisation. Was it for another cause other than COVID-19, particularly among asymptomatic and/or those seropositive? Limited data tables and analysis. Limited socio-demographic information. There is no information about the general community prevalence of SARS-CoV-2 during the study period.

* Asymptomatic: No clinical signs or symptoms, chest imaging if performed was negative

† Mild: Symptoms of acute upper respiratory tract infection including fever, cough, myalgia, sore throat, runny nose or sneezing or gastrointestinal symptoms such as vomiting, diarrhoea, abdominal pain with normal physical exam

CHARACTERISTIC	SUMMARY
Reference	Skolmowska D, Głabska D, Guzek D. Hand Hygiene Behaviors in a Representative Sample of Polish Adolescents in Regions Stratified by COVID-19 Morbidity and by Confounding Variables (PLACE-19 Study): Is There Any Association? Pathogens 2020;9. doi:10.3390/pathogens9121011.
Aims	To analyse hand hygiene behaviours in a national representative sample of Polish adolescents in regions stratified by COVID-19 morbidity
Study design/setting	Cross-sectional online survey; April 2020; students were learning remotely
Population	Pupils (aged 15-20 years) attending participating secondary schools
Country	Poland
Method	<p>Recruitment: Students were recruited via their head teacher. Secondary schools were selected at random (stratified) in two stages:</p> <ul style="list-style-type: none"> i) conducted for all 16 regions, 31 March–14 April 2020 - random selection of five counties out of each of the region and five secondary schools out of each of the county, resulting in random selection of 400 secondary schools from Poland ii) conducted for 10 regions, where a total number of obtained answers was insufficient in the first stage, 15 April–29 April 2020 - random selection of five counties out of each of the region and five secondary schools out of each of the county, resulting in random selection of 250 secondary schools from Poland. <p>Measures: First section included questions about the general characteristics of respondents. The second part included questions about hand hygiene behaviours using the Handwashing Habits Questionnaire.</p> <p>Analysis: Answers from respondents were compared between sub-groups stratified by region, based on the following traits: COVID-19 morbidity in the region, assessed based on the number of the COVID-19 cases in April 2020 (10 regions that had contributed less than 30% of cases were defined as 'low' and 6 which had more than 70% were defined as</p>

	<p>high); status of the region based on the gross domestic product; environment (rural/urban), assessed based on the size of the town, as classified into groups of villages and small towns, medium cities, big cities.</p> <p>The statistical analysis was based on the comparison of the share of groups, which was conducted using the chi² test</p>
Results	<p>28 schools (4.3% response rate) agreed to take part. 2,323 students were recruited (57.8% response rate). After a randomised pair-matching procedure (within schools and age) to obtain a balance of girls and boys representative of the general population, information from 1,222 adolescents was analysed.</p> <p>In regions of low COVID-19 morbidity, a greater proportion of adolescents, than in regions of high morbidity, reported washing their hands before meals ($p = 0.0196$), after meals ($p = 0.0041$), after preparing meals ($p = 0.0297$), before using the restroom ($p = 0.0068$), after using the restroom ($p = 0.0014$), after combing their hair ($p = 0.0298$), after handshaking ($p = 0.0373$), after touching animals ($p = 0.0007$), after contacting babies ($p = 0.0278$), after blowing nose ($p = 0.0435$), after touching sick people ($p = 0.0351$), and after cleaning home ($p = 0.0234$). In regions of low COVID-19 morbidity, a higher percentage of adolescents, than in regions of high morbidity, reported hand washing behaviours such as removing watch and bracelets ($p = 0.0052$), removing rings ($p = 0.0318$), and drying hands with towel ($p = 0.0031$).</p> <p>For the comparison in regions stratified by Gross Domestic Product, the differences were only minor and inconsistent. For the comparison in place of residence stratified by number of residents in city, there were some minor differences indicating better hand hygiene behaviours in the case of villages and small towns when compared with medium and large cities ($p < 0.05$).</p> <p>The authors conclude that that adolescents from regions of low COVID-19 morbidity presented more beneficial hand hygiene habits than those from regions with high COVID-19 morbidity.</p>
Comments	<p>Basic analysis which does not take account of potential confounding factors such as socio-economic status of the region, population density, age of the respondent etc. Regions characterised low and high morbidity by number of cases rather than cases per population</p>

	(1000 or 100,000). Recruitment was done in 2-stages in April – 31 st March -14 th April and 15 th – 29 th April, due to lack of response in 10/16 regions in the first recruitment phase. During this time the number of cases in Poland increased quickly. It is possible that adolescents' hand hygiene may have changed during this time. It is not known which regions were recruited in what phase. It is not known whether the regions differed in their mitigation approaches. No socio-demographic information is given. It is not possible to tell if the responses that were included in the analysis differed in any way from the overall responses.
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CHARACTERISTIC	SUMMARY
Reference	Thielecke M, Theuring S, van Loon W, Hommes F, Mall MA, Rosen A, et al. SARS-CoV-2 infections in kindergartens and associated households at the start of the second wave in Berlin, Germany – a cross sectional study. <i>MedRxiv</i> 2020. doi:10.1101/2020.12.08.20245910.
Aims	To assess the prevalence of SARS-CoV-2 infections and IgG seroreactivity among pre-school children, educators, and household members connected with Berlin kindergartens during the beginning of the second pandemic wave.
Study design/setting	Cross-sectional surveillance study: 28 th September – 2 nd October
Population	Pre-school children and their household members along with early years staff in 12 kindergartens
Country	Germany
Method	Recruitment: Berlin city districts were divided into three strata according to socio-economic status. In each stratum, two districts were randomly selected using a random number generator, and in each selected district, two kindergartens were randomly chosen. The aims was to recruit 20 children and 5 staff in each kindergarten, whenever possible,

	<p>belonging to one care-group. Household members of children and staff were invited to participate in the survey.</p> <p>Method: A study team visited each facility to collect samples and data. Children and staff were interviewed on present signs and symptoms, and forehead temperature was measured. Swabs were taken from the oropharynx and nasal passages. Finger-prick blood samples were collected on filter paper. Participants and household members completed a questionnaire about signs and symptoms of infection in the preceding two weeks, risk factors, and hygiene behaviour-related measures. Infection prevention measures implemented at the kindergartens were documented.</p> <p>Swabs were analysed for SARS-CoV-2 infection determined by RT-PCR. Dried blood spots for anti-SARS-CoV-2 IgG</p> <p>Analysis: approach not stated</p>
Results	<p>720 individuals participated in the study (155 pre-school children, 78 staff, 487 household members). The median age of the kindergarten children was 4.4 years (range 1-6.3 years). Two in three household members were adults (68.6%, n=334) in addition to schoolchildren (20.3%; n=99) and younger children (10.5%, n=51). Signs and symptoms were present in one in four kindergarten children, including runny nose (17.0%, 26/153), cough (11.1%, 17/153), and sore throat (2.0%, 3/153). Leading complaints among symptomatic educators (28.9%) were headache (14.7%, 11/75), runny nose (13.5%, 10/74), and cough (11.8%, 9/76). Upon examination, 2.6% and 1.3% of children and educators were febrile, respectively.</p> <p>Swabs were collected from 98.1% (152/155) of children, all educators (78), and 96.7% (471/487) of household members. SARS-CoV-2 was detected not detected in any swabs. One childcare worker showed IgG seroreactivity.</p> <p>Two-thirds (8/12) of the facilities had a physical distance rule between staff and 91.7% (11/12) between staff and parents. Obligatory facemask wearing by staff was stated in 41.7% (5/12) for parental contacts and in 8.3% (1/12) for contacts among colleagues. Attendance despite (afebrile) symptoms of common cold was allowed by 75% (9/12) of daycare centres, and 72.7% (8/11) of kindergartens reported daily training of hygiene rules with the children. In most facilities (83.3%, 10/12), children were taken care of in</p>

	fixed groups and rooms, which were ventilated more than five times/day in half of the cases.
Comments	In that week, 1,561 PCR-confirmed SARS-CoV-2 infections were registered in Berlin (29 and 43 cases in children aged 0-4 and 5-9 years of age, respectively). The 7-day-incidence was 38 cases/100,000 inhabitants, and numbers started to grow exponentially. Relatively low community prevalence at time of study. The response rate is not stated and no socio-demographic information so it is not possible to tell if those taking part were representative of the wider population. Limited data tables and analysis.

CHARACTERISTIC	SUMMARY
Reference	Zhu Y, Bloxham CJ, Hulme KD, Sinclair JE, Tong ZWM, Steele LE, et al. A meta-analysis on the role of children in SARS-CoV-2 in household transmission clusters. Clin Infect Dis 2020. doi:10.1093/cid/ciaa1825.
Aims	To investigate the prevalence of paediatric index cases in household transmission clusters of SARS-CoV-2 as well as the secondary attack rate (SAR) of children and adults in household transmission clusters.
Study design	Meta-analysis of published, de-identified, data made available between Dec 1, 2019, and August 24, 2020.
Search strategy	Information was accessed from the World Health Organization news, Google Scholar, PubMed, the Lancet COVID-19 resource centre, Clinical Infectious Disease Journal and New England Journal of Medicine. Search terms: ("COVID19" OR "SARS-CoV-2" OR) AND ("household transmission" OR "family cluster" OR "household contact") AND ("transmissibility" OR "attack rate"). Supplemented by check of reference list of included papers
Inclusion criteria	All studies included in the index case analysis were household SARS-CoV-2 transmission clusters that i) identified the index case of the cluster ii) defined the number of infected

	<p>contacts in the household and iii) recorded the initial disease onset date of all cases in the cluster.</p> <p>All studies included in the secondary attack rate meta-analysis were household SARS-CoV-2 transmission clusters that i) defined the secondary attack rate within the cluster and ii) defined the age of contact cases in the cluster.</p>
Exclusion criteria	<p>Did not meet the inclusion criteria</p> <p>Studies that were duplicate publications, pre-prints and/or reviews were excluded</p>
Countries	<p>China, Japan, France, Germany, Italy, USA, Vietnam, Malaysia, Singapore, Morocco, Greece and South Korea</p>
Method	<p>A household transmission cluster was defined as a group of ≥ 2 confirmed cases of SARS-CoV-2 infections in co-habiting individuals in whom the diagnosis of cases occurred within 2 weeks of each other. The index case was defined as the individual in the household cluster who first developed symptoms. Household contacts were defined as co-habiting individuals, typically family members, close relatives, housemates or house helpers. An individual with laboratory confirmation of SARS-CoV-2 was considered to be infected. Household secondary attack rates were defined as the proportion of confirmed infections among all household contacts.</p> <p>Susceptibility to infection was estimated by calculating the secondary attack rate for household close contacts associated with the index case in each transmission cluster.</p> <p>The Relative Risk (RRs) for SARS-CoV-2 infection was estimated, stratified by the age of household contacts for each study. RRs were pooled using a random effects model, equalizing the weight of the studies to the pooled estimate. 95% confidence intervals (CI) were used to assess statistical significance in all models. The I^2 statistic was used to evaluate heterogeneity between studies. A threshold of $I^2 > 50\%$ was used as indicating statistically significant heterogeneity.</p>
Results	<p>In total, 57 papers met the inclusion criteria. 43 articles were included in the index case analysis. 14 articles were used in the secondary attack rate analysis.</p>

	<p>In analysis of the cluster index cases, there were 213 SARS-CoV-2 transmission clusters. 8 identified (3.8%) a paediatric index case. Of 611 individuals in the 213 clusters there were 102 children. Where a child was identified as an index case, 16 secondary cases (4%) were identified, whereas 382 (96%) of secondary cases were linked with adult index cases.</p> <p>There were insufficient case numbers to determine whether children are more or less able to transmit SARS-CoV-2 in a household setting compared to adult index case.</p> <p>Asymptomatic index cases were associated with a significantly lower secondary attack rate in contacts than symptomatic index cases (RR=0.17, CI 0.09-0.29); I²=87%</p> <p>In 11 observational studies of household transmission clusters, the secondary attack rate in tested paediatric household contacts (<18 years) was significantly lower than that in adult household contacts RR=0.62 (95% CI, 0.42-0.91); I²=83%</p> <p>In a subset analysis where additional information was provided on the age of the paediatric contact, younger children (<10 years) were no or less susceptible to infection compared to older children (>10 years) RR = 0.69 (95% CI, 0.26-1.82) with no significant heterogeneity (I² =33%, P=0.17).</p>
Comments	<p>No details are given about number of reviewers to screen. No mention of quality assessment. Full details of all the included studies not included even in supplementary tables available online – only 14 secondary attack studies are included. Primary studies report cases from January – March 2020, with the majority from China and South Asia. At the time of these studies, testing may have been targeted to people who were ill enough to require medical attention. Children are less likely to be seriously ill so may not have been tested. Not all data tables are included. Considerable heterogeneity between some studies included in sub-analyses. Inconsistency of numbers reported between tables and text of article.</p>

Health and wellbeing

Mental health and wellbeing

CHARACTERISTIC	SUMMARY
Reference	Bignardi G, Dalmaijer ES, Anwyl-Irvine AL, Smith TA, Siugzdaite R, Uh S, et al. Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. Arch Dis Child 2020:archdischild-2020-320372. doi:10.1136/archdischild-2020-320372.
Aims	To test whether changes in emotional well-being, anxiety and depression occurred during lockdown.
Study design/setting	Longitudinal; online survey; baseline assessments June 2018 - March 2019 in the school group and December 2018 -September 2019 in the laboratory group; during lockdown 29 th April – 19 th June
Population	Children in year 3 & 4 attending 6 schools
Country	England
Method	<p>Recruitment: The Resilience in Education and Development (RED) study comprises two groups. A larger school group assessed in classrooms (n=567, from 22 classes, 6 schools) and a smaller group of children (N=92). Families in the lab group were recruited via posters, word of mouth and online Facebook advertisements. In the school groups, all children in year 3 and 4 classroom groups were recruited into the study using opt-out parental consent. All legal caregivers of children in the lab group were contacted, and five schools contacted caregivers in the school group, to complete the survey.</p> <p>Measures: the emotional problems subscale of the Strengths and Difficulties Questionnaire (SDQ) and RCADS-short form subscales for depression and anxiety. At baseline, teachers and caregivers completed the SDQ for the school and lab groups, respectively. Children in</p>

	<p>both groups completed the RCADS, along with caregivers in the lab group. At the lockdown data collection point, only caregivers completed the assessments.</p> <p>Analysis: The impact of lockdown was assessed by combining child, teacher and caregiver reports using linear mixed models. Participant's age, gender and SES were controlled in sensitivity analyses. SES was measured using a mean of: household income, homeownership, caregiver education and neighbourhood deprivation. Interaction effects between age, gender and SES and lockdown status were examined, by multiplying lockdown status with these variables and entering them into the mixed model. Mental health variables were scored using the arithmetic mean response, after recoding each item so that a higher score indicated worse mental health. For mixed linear models, all three mental health outcomes were quantile-normalised to match a standard normal distribution. Normalisation was performed for each outcome after transforming data into a 'long' format, with repeated measurements (including before and during lockdown from all raters) gathered in a single variable. Variables were converted into a percentile rank, and then the standard normal distribution quantile function was applied.</p>
Results	<p>168 caregivers who had completed the baseline measures, also completed the measures during lockdown (response rate 29%). From the mixed linear models with no control variables, we estimated a non-significant decrease of 0.25 in SDQ emotional problems ($B = -0.25$, 95%CI -0.54 to 0.05) and a decrease of 0.06 in RCADS anxiety scores ($B = -0.06$, 95%CI -0.34 to 0.23) during lockdown compared with before. The proportion of children with SDQ emotional problem scores in the elevated range changed very little, decreasing from 13% (19 children) to 8% (12 children) from before to during lockdown.</p> <p>Standardised RCADS depression scores were on average 0.74 (95% CI 0.46 to 1.01) higher during lockdown than before. Controlling for demographic factors separately (age, gender and SES) did not strongly alter estimates for these effects. Interaction effects of these three factors were also estimated to assess whether changes in mental health disproportionately occurred in certain groups. No interaction effects were statistically significant, although these estimates are highly uncertain.</p>
Comments	<p>Age at baseline mean 8.7 ± 0.63 classroom group; 8.5 ± 0.66 lab group. Age at lockdown assessment mean 10.5 ± 0.74 classroom group, 9.4 ± 0.78 lab group.</p>

	Small sample size, original sample was convenience, lack of child-reported measures during lockdown. Overall, 70% n=117 were home owners, 59% n=99 had degree. It is not known whether those taking part were representative of the wider population. Poor response rate at 2 nd data collection point.
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CHARACTERISTIC	SUMMARY
Reference	Orgilés M, Morales A, Delvecchio E, Mazzeschi C, Espada JP. Immediate Psychological Effects of the COVID-19 Quarantine in Youth From Italy and Spain. Front Psychol 2020; 11:579038. doi:10.3389/fpsyg.2020.579038.
Aims	To examine the emotional impact of the quarantine on children and adolescents
Study design/setting	Cross-sectional; online survey; 15 days after lockdown imposed
Population	Parents of children aged 3-18 years
Country	Italy and Spain
Method	<p>Recruitment: Participants were recruited via social networks</p> <p>Measures: bespoke questionnaire which collected information about the sociodemographic of parents and children; parental perception on how quarantine emotionally affected their children through 31 symptoms, with responses ranging from 1 (much less compared to before quarantine) to 5 (much more compared to before quarantine); parents' perception of family coexistence during quarantine, severity of the situation caused by coronavirus with regard to the family's well-being, and parents' stress, on a five-point scale; children's routines: time of screen use, physical activity, and hours of sleep during quarantine compared to before.</p> <p>Analysis: Descriptive statistics to analyse participants' sociodemographic variables and other variables of interest. Because the variables were not normally distributed (according to the Kolmogorov-Smirnov test, $p < 0.05$), non-parametric tests were used. Differences between Italy and Spain in sociodemographic variables, children's psychological responses,</p>

	<p>emotional impact on the children’s primary caregivers, and the children’s routines were analysed using chi-square (categorical variables) and the Mann–Whitney U test (continuous variables). Bonferroni corrections applied to p values were used to reduce the risk of type I error.</p> <p>The odds ratio (OR) was reported for 2 × 2 tables. The effect size of the intergroup differences was calculated using the Rosenthal r statistic, which is interpreted according to the following ranges: 0.1, small; 0.3 medium; and 0.5, large.</p> <p>Cramer’s V was calculated as a measure of association between multi-categorical variables and interpreted as follows: >0.25, very strong; >0.15, strong; >0.10, moderate; >0.05, weak; and >0, none or very weak.</p> <p>Multivariate analyses were performed by generalized linear (GENLIN) modelling. For each child psychological reaction, GENLIN modelling was used to examine differences between both countries, adjusting for baseline differences, parents’ age, and parental stress. GENLIN models for child routines were used to identify changes during home confinement, compared to before this period and between both countries during home confinement. All models were adjusted for baseline differences in screen use, physical activity, and hours of sleep) and parental variables (parents’ perception of family coexistence during quarantine, severity of the situation caused by coronavirus with regard to the family’s well-being, and parents’ stress) was also analysed using Spearman correlations. A new variable, “change,” was created by subtracting the score on the child routine variables at the time “before confinement” from that “during quarantine.”</p>
Results	<p>1,143 parents/caregivers completed the survey.</p> <p>Nine hundred and eighty parents (85%) observed changes in their children’s emotional state and behaviours during the early stages of lockdown. The most common changes (present in at least 20% of the responses) were that children were reported to have had more difficulty concentrating (76.6%), felt more bored than usual (52%), were more irritable (39%), were more restless (38.8%), were more nervous (38%), felt lonelier (31.3%), were more uneasy (30.4%), were more worried (30.1%), were more likely to argue with the rest of the family (29.7%), were more dependent on them (28%), were more anxious (28.4%), were angrier (25.9%), were more reluctant (24.7%), were sadder</p>

(23.3%), were afraid of COVID-19 infection (23.1%), were more worried when someone left the house (22%), and ate more than usual (21.9%).

Primary caregivers reported that family coexistence during the quarantine was moderately easy ($M = 3.68$, $SD = 1.98$, range = 1–5). Only 11.4% reported that family coexistence during the quarantine was difficult or very difficult, and more than half (61.8%) said that family coexistence was easy or very easy. The neutral option was selected by 26.8%.

Parental level of stress was moderate ($M = 3.18$, $SD = 1.02$, range = 1–5). Approximately one-third of the parents (35.4%) reported being stressed or very stressed, and 39.4% chose the option “somewhat stressed.” One in four (25.2%) parents indicated that they did not feel stressed because of the current situation.

When family coexistence during the quarantine was rated as more difficult, the parents tended to rate their children as more restless, more anxious and uneasy, more nervous, more likely to argue with the rest of the family, angrier, more frustrated, more irritable, having more difficulty concentrating, presenting more behavioral problems, and less likely to be quiet (compared to before home confinement). Spearman correlations were indirect (except for being quiet) and low, ranging from -0.06 to -0.15 .

Caregivers who perceived the current situation as more serious with regard to their family’s wellbeing tended to report that, during quarantine, their children were more concerned, were more restless, were more anxious, were sadder, were lonelier, were more nervous and uneasy, were more likely to argue with the rest of the family, cried more easily, were angrier, were more bored, had more difficulty concentrating, were more afraid of COVID-19 infection, and were more worried when one of them left the house (compared to before home confinement). Spearman correlations were direct and low, ranging from 0.06 to 0.15.

Parents who perceived themselves as more stressed by the situation tended to report that, during quarantine, their children were more worried, were more restless, were more anxious, were sadder, were more reluctant, were lonelier, woke up more frequently, were more indecisive, were more uneasy, were more nervous, were more afraid to sleep alone, were more likely to argue with the rest of the family, cried more easily, were angrier, were more frustrated, were more bored, were more irritable, had more difficulty concentrating and sleeping, were more easily alarmed, were more afraid of COVID-19 infection, were

	<p>more dependent on them, had more behavioural problems, and were more worried when one of them left the house (compared to before home confinement). Spearman correlations were direct, ranging from low ($\rho = 0.07$) to moderate ($\rho = 0.26$).</p> <p>During the quarantine, children spent more time daily using screens such as iPads, TVs, mobiles, or computers ($\beta = 64.98$, $SE = 0.08$, Wald χ^2 95% CI [55.38, 76.25], $p < 0.001$); spent less time doing physical activity ($\beta = 0.04$, $SE = 0.07$, Wald χ^2 95% CI [0.03, 0.04], $p < 0.001$); and tended to sleep a bit more (mean hours) ($\beta = 1.24$, $SE = 0.07$, Wald χ^2 95% CI [1.07, 1.42], $p < 0.01$) compared to before this period and controlling for parental' age and stress.</p> <p>Changes in child routines were related to parental perception on how easy it is for the family to live together during the quarantine, parental perception on how serious the situation is, and parental stress. When family coexistence during the quarantine was rated as easier, parents informed that their children tended to spend more time doing physical exercise ($\rho = 0.08$; $p = 0.004$). For parents who perceived the situation as more serious, their children made more use of screens ($\rho = 0.07$; $p = 0.01$) during quarantine compared to the rest. Parents with higher levels of stress tended to report that their children made more use of screens ($\rho = 0.05$; $p = 0.01$), spent less time on physical activity ($\rho = -0.10$; $p \leq 0.001$) and slept fewer hours than the rest ($\rho = -0.12$; $p \leq 0.001$).</p>
Comments	<p>Recruitment introduces a potential source of bias. Undertaken early in the lockdown period (15 days after). Does not differentiate results by age (mean age 9.08 years ± 4.22). 61.9% of caregivers were college educated or above. Only 5% had lost their job due to COVID-19. Respondents lived in 94 cities in Italy and 87 cities in Spain. Unlikely to be representative of wider population.</p>

CHARACTERISTIC	SUMMARY
Reference	Scott SR, Rivera KM, Rushing E, Manczak EM, Rozek CS, Doom JR. "I Hate This": A Qualitative Analysis of Adolescents' Self-Reported Challenges During the COVID-19 Pandemic. J Adolesc Health 2020. doi:10.1016/j.jadohealth.2020.11.010.
Aims	To determine what adolescents reported as their biggest challenges faced during the COVID-19 school closures and social-distancing policies
Study design/setting	Cross-sectional; online survey; 1 st -18 th May; In two schools, there was a stay-at-home order in effect through May 8 and a safer-at-home order (less restrictive than stay-at-home) from May 9 through the end of the survey period. For the third school, a stay-at-home order was in place throughout the survey period.
Population	Students in three U.S. urban high schools while teaching and school-related activities were remote
Country	US
Method	<p>Recruitment: School administrators invited their students to take part</p> <p>Method: The survey consisted of validated or adapted instruments that asked questions about students' physical and mental health symptoms and experiences during the COVID pandemic. Students were asked about sleep, changes in diet, demographic information, and broad changes to mental health.</p> <p>This report focuses on one question in the survey: "What are your three biggest challenges right now? Students could reply in an open-ended manner or skip the question.</p> <p>Analysis: content analysis approach</p>
Results	<p>719 students completed at least one question about their demographic information and answered the question reported in this paper (M=16.28 years old; range: 14-19 years).</p> <p>For the whole sample, 14 categories of challenges were identified:</p>

- a) Academic and work habits: reflected challenges with online learning, preparing for standardized tests, focus, work ethic, and productivity.
- b) Mental health: referred to challenges related to mental health, including depression, loneliness, stress, and anxiety
- c) Physical health: included themes such as diet, exercise, somatic symptoms (e.g., headaches), and sleep.
- d) Friends: included friend conflict, missing friends, and not seeing friends.
- e) Family: included challenges related to family conflict, stressed family members, and family members being unsupportive.
- f) Routine: including loss of routine and activities they used to do, chores, finding entertainment, and adjustment to fewer scheduled activities.
- g) Social connection and community: general social interaction, missing people who are not indicated to be family or friends, and needing time to self.
- h) COVID rules and adjustment: referred to comments regarding the pandemic, including quarantine rules, shutdown of public places, maintaining six feet of distance from others, and being unable to go places
- i) Future: included responses such as feeling uncertain about the future, the college transition, and summer plans.
- j) Socioeconomic: involved challenges (2.0% of all units) related to income, occupation, and housing.
- k) Important events: referred to challenges related to birthdays, graduation, senior year in general or specific events related to senior year, and missing opportunities.
- l) Contraction/exposure to COVID: reflected adolescents' challenges related to exposure or contraction of COVID-19 for themselves or their family members, including essential worker family members and family members who died from the infection.
- m) Technology: included responses involving screen time, internet connections, and a transition to everything online.

When examining challenges by the class year, first, second, third, and fourth year students generally reflected the responses of the entire sample. Friends were more of a challenge for the first and second year students and third year students reported the most challenges

	<p>related to academic and work habits. Future concerns were endorsed more by third and fourth year students, but especially for fourth year students.</p> <p>Gender minority students reported the most challenges with mental and physical health, and social connection and community. However, this group reported the least challenges with family and friends. Students identifying as male had the most challenges around academic and work habits and the future. Female students reported the most challenges with friends and family.</p> <p>Students who identified as black/African-American and Asian indicated the most challenges with academic and work habits. Black-white students had the highest challenges in mental health, family, social connection and community, and COVID rules and adjustments, and students who were Hispanic/Latinx identified the most challenges related to physical health. Non-white multiracial-Latinx students reported the highest challenges in friends and technology. White-Latinx students described the most challenges related to routine and contraction/exposure to COVID-19. White-Asian students reported the most challenges in the socioeconomic category, and white students indicated the most challenges related to the future.</p>
Comments	Unclear how representative of the wider population those taking part were. Of 1,125 respondents who started the survey, 719 were included in this report. It is not clear from this report what the overall response rate was.

Physical health

CHARACTERISTIC	SUMMARY
Reference	Clarke JL, Kipping R, Chambers S, Willis K, Taylor H, Brophy R, et al. Impact of COVID-19 restrictions on pre-school children's eating, activity and sleep behaviours: a qualitative study. MedRxiv 2020. doi:10.1101/2020.12.01.20241612.
Aims	To explore the experiences of parents of children due to start school in September 2020
Study design/setting	Qualitative interviews by phone or video call; July/August 2020

Population	Criteria for inclusion were: (1) parent/carer of a child aged 3-5 years in their final year at pre-school; (2) child usually attends pre-school at least once per week; (3) child was due to start school in September.
Country	England
Method	<p>Recruitment: participants were recruited through nurseries and local Facebook community groups in the South West and West Midlands of England. Interested parents (n=85) completed an online form to check eligibility and collect postcode (for calculation of Index of Multiple Deprivation (IMD) score) and ethnicity data for sampling purposes. To provide socioeconomic and ethnic diversity in the sample, sampling was weighted towards parents in the most deprived areas and those from BAME populations.</p> <p>Method: Qualitative interviews with parents focusing on: physical activity, sedentary behaviour, food intake and sleep. A topic guide was used flexibly to guide discussions with parents encouraged to talk openly about their experiences. Interviews were audio-recorded, transcribed verbatim and anonymised. Following each interview, notes were made of key points raised.</p> <p>Analysis: Transcripts were checked for accuracy before analysis. Transcripts were read to gain familiarity with the data. Three transcripts were independently coded by the researchers to generate an initial list of codes. Codes were both deductive (generated from the topic guide and research questions) and inductive (generated from interview data). Differences in coding were resolved through discussion to produce an agreed coding framework. Subsequent transcripts were single coded using the coding framework with further discussion to clarify or expand the framework as needed.</p>
Results	20 parents took part; sixteen mothers and four fathers. Twelve parents were recruited via nurseries and eight via Facebook. The average age of parents was 34 years (range 21-45 years). Half the sample described their ethnicity as White British. Thirteen participants were educated to degree level. Half resided in the most deprived IMD quintile. Five participants were single parents. Thirteen participants reported at least one parent in their household was not working during the lockdown period; a further three reported that no

household member was currently in employment. Two participants did not have access to a garden.

Most parents reported that their child's snacking had increased over lockdown, something they often linked to the stay-at-home restrictions. Children were bored and consequently snacked more as they were "cooped up" at home. Others felt loss of routine had disrupted rules around snacking. Being together all day made dealing with demands for snacks challenging, with some parents allowing greater access to less healthy items than normal. In response, some parents created make-shift rules around food, balancing child demands with wanting to provide 'healthy' snacks. Another parent made healthy snacks more accessible. However, some parents reported giving additional 'treats' to their children to compensate for the pandemic's impact.

Several participants reported spending more on food during lockdown. Some related this to the whole family now being at home, as well as increased snacking, while others felt prices increased. Lockdown increased family food bills in other ways too. One family no longer had access to free meals at their child's nursery. Another participant who was shielding had moved to on-line deliveries, a service unavailable at their normal cheaper supermarkets.

Most parents felt their child was less active during lockdown. Several parents related this reduction to the closing of childcare facilities which removed usual opportunities for activity. Opportunities for active transport to and from childcare were also lost. In addition, normal activities (like swimming, soft play) were closed and opportunities to socialise with friends or grandparents were restricted. Parents noted several factors that helped children stay active. Having a sibling was important, providing someone to play with. Equally, access to play equipment helped facilitate activity. Access to outside space was also important. Only two parents had no access to outdoor space, but both described this as challenging during lockdown.

The good weather experienced during much of lockdown was also seen as an important facilitator of activity. Parents often put effort into keeping their child physically active. This was easier for families where one parent was not working.

Parents reported that their child had engaged in a range of sedentary activities during lockdown and its easing, including reading, drawing and crafting. However, screen time

	<p>was mentioned most frequently with almost all parents reporting substantial increases. For many families, screen time filled the void left by being unable to go out or socialise. However, many felt screen time had been useful during this difficult period, with one parent referring to it as a “lifesaver”. For those who were trying to work from home, it was often the only way they could manage. Screen time was also used to provide much needed respite from the intensive parenting effort lockdown enforced. Parents often distinguished between ‘good’ and ‘bad’ screen time. Educational or interactive screen time was considered better than passive television watching. Some parents created new household rules to manage this increased screen time. This included restrictions on the amount, times of day or content of screen time.</p> <p>Almost half of parents reported negative changes to their child’s sleep. Many reported difficulties in getting their child to sleep, with some staying up very late. Loss of routine associated with lockdown was again a source of difficulty for some families.</p> <p>Many talked positively about returning to previous activities (e.g. swimming, gymnastics) and were pleased to see these opening again. However, several admitted feeling “wary” about how safe these were, especially those involving close contact (such as soft play).</p> <p>Some parents expressed concerns about the impact of lockdown on their child’s skills and confidence.</p>
Comments	65% of participants were educated to degree level

CHARACTERISTIC	SUMMARY
Reference	Tornaghi M, Lovecchio N, Vandoni M, Chirico A, Codella R. Physical activity levels across COVID-19 outbreak in youngsters of Northwestern Lombardy. J Sports Med Phys Fitness 2020. doi:10.23736/S0022-4707.20.11600-1.
Aims	To describe the physical activity patterns and the impact of isolation measures on them.
Study design/setting	Cross-sectional survey; administered three times 1) at end of January 2020 , before the first Italian COVID-19 case was diagnosed in southern Lombardy (February 21st) ; 2)

	during the lockdown measures imposed by Italian Government (March - April) ; 3) when these COVID - actions were lifted (May)
Population	Adolescents aged 15 - 18 years attending North-Western Lombardy high schools (Brianza area)
Country	Italy
Method	<p>Recruited through physical education teachers</p> <p>Measure: online version of International Physical Activity Questionnaire (IPAQ)</p> <p>A 3x3 (analysis of variance) ANOVA was performed considering the MET* - min/week as the dependent variable, a three levels' factor namely "CATEGORY" (inactive <700 MET - min/week, moderate between 700 and 2519 MET - min/week and intense > 2520 MET - min/week), and a three levels' TIME factor (pre, during, post). The model was corrected as the Levene's test of equality of error variances was significant.</p>
Results	<p>Pre n=864, during n=395, post n=287.</p> <p>PA levels were expressed as MET-min/week, the ANOVAs showed a significant main effect for the TIME factor ($F=3.49$; $\eta^2 = 0.005$ $p=0.03$). Pairwise comparisons demonstrated a significant difference between PA levels performed before (m pre = 1676.37; sd = 20.6) and after (m post = 1774.50; sd = 33.93) the governmental restrictions, and a not significant effect between during and pre, or during and post governmental restrictions.</p> <p>Considering the interaction between TIME*CATEGORY, there was a significant interaction effect ($F=8.37$; $\eta^2 = 0.021$; $p<0.001$). Pairwise comparisons showed that there were significant effects between "pre" and "during" (m pre =3151.43; sd = 42.41; m during =3467.48; sd = 55.85; $p<0.001$), and "pre" and "post" (m pre =3151.43; sd = 42.41; m post =3515.73; sd = 65.75; $p<0.001$) only for the highly - active students (i.e. "intense" > 2520 MET - min/week).</p>

* MET = Metabolic Equivalent of Task

	Comparing the students' PA levels, as determined by the IPAQ scoring, in relation to the WHO recommendations* for children and adolescents, the fulfilment of WHO for being considered as "physically active" was scarcely prevalent before the Italian lockdown (~6%); it increased during the lockdown and when overall activities were reinstated (~14%)
Comments	Not clear whether this is repeat cross-sectional design or longitudinal. No socio-demographic information given. Not clear how MET were calculated. It is not reported what proportion of adolescents in the physical activity sub-groups at baseline took part in later surveys.

CHARACTERISTIC	SUMMARY
Reference	Ng K, Cooper J, McHale F, Clifford J, Woods C. Barriers and facilitators to changes in adolescent physical activity during COVID-19. BMJ Open Sport Exerc Med 2020; 6:e000919. Doi: 10.1136/bmjsem-2020-000919.
Aims	To examine how adolescents' physical activity changed during school closures and to identify the key barriers and facilitators for these changes during lockdown
Study design/setting	Cross-sectional; April 2020
Population	Adolescents who were pupils of 6 schools taking part in the Active School Flag (ASF) initiative.
Country	Ireland
Method	Recruitment: An online survey link was sent to students via class tutors in participating schools

* ≥ 60 min/day moderate-vigorous physical activity and ≥ 3 times/week of vigorous physical activity

Measure: Moderate-to-vigorous physical activity (MVPA) was measured through the past 7-day (number of days of at least 60 min of MVPA) item from the physical PACE+ instrument. To allow examination of small changes in physical activity (PA) behaviour across a 7-day period, the scale was divided into four categories of activity status; inactive (0–2 days); somewhat active (3–4 days), highly active (5–6 days) and daily active (7 days; meeting MVPA guidelines).

A single item assessing frequency of 'Exercises that may strengthen your muscles, such as push-ups, sit-ups, weight lifting or heavy yard work during the past 7 days?' was asked with 0–7 days as response options.

Adolescents were asked 'was the amount of PA you did in the last 7 days typical of the amount that you would normally do?' with 'yes', 'no, I usually do more' or 'no, I usually do less'. Students who responded to either 'no' option, were asked, 'If no, why was this week unusual?'

Mode of transport usually used to travel to and from school was assessed via five options: walk, bicycle, car, bus and train. Two groups were created, (1) passive: cars, bus and trains and (2) active: walk and bicycle.

Prior PA habits were created from combining three frequency PA behavioural variables in different contexts; PE, lunchtime activities, and after-school sports or physical activities.

PE was a 5-point scale from Never (1) to Always (5), whereas lunchtime and after-school activities range was a 7-point scale from Never (1) to 4 or more days per week (7).

Analysis: Statistical analyses were carried out through multiple χ^2 tests of independence for determining differences from the independent variables (gender, BMI, strengthening exercises, transport mode and PA habits) by activity status (inactive, somewhat active, highly active and daily active). Data were then stratified by binary groups of (a) less PA (1) versus other (0), (b) no change (1) versus some change (0) or (c) more PA (1) versus other (0), and repeated multivariate binary logistic regressions were performed with all independent variables, after controlling for age to investigate the adjusted ORs of predictors to PA behaviour during lockdown.

Open-ended responses were analysed qualitatively.

Results

1,551 young people (33% response) took part, with complete responses from 1,214 (response rate 26%).

A quarter of students (25%, n=308) were inactive, a third (34%, n=401) were somewhat active, a quarter (26%, n=316) were active and 15% (n=180) were daily active.

Half the adolescents (49.7%) reported doing less PA during the lockdown period. Almost a third (31.2%) reported doing the same amount of PA, and one in five (19.1%) reported they did more PA during lockdown. As activity status lowered, the proportion negatively impacted by COVID-19 increased, and vice versa for highly active children (X^2 6 df=85.2, $p<0.001$).

Adolescents who were overweight (OR=1.8, CI=1.2– 2.7) or obese (OR=2.2, CI=1.2–4.0) were more likely than those who were normal weight to report less PA during lockdown.

Adolescents with strong prior PA habits were less likely (OR=0.4, CI=0.2–0.6) than those with weak PA habits to have reported less PA during lockdown.

Females were less likely (OR=0.7, CI=0.5–0.9) to report the same levels of PA as usual during lockdown than males. Similarly, those who engaged in strength training at least three times per week (OR=0.6, CI=0.4–0.8) were less likely to report the same levels of PA during lockdown in comparison to those who participated in strength training less often.

The open ended responses (N=947) were grouped into 15 themes. The open-ended text was only completed by students who reported changes in their MVPA levels, giving insights only on change and not the phenomenon of behaviour during lockdown. It was common for adolescents to provide multiple barriers or facilitators in their answers, and three themes were coded both as barriers and facilitators to PA: coronavirus, time and no school.

Twelve themes explained the reduction in PA during lockdown. These were coronavirus, club training cancelled, health concerns, low motivation, no school, too much schoolwork, closed facilities, lack of resources, mental health, time, lack of routine and other. Of the top seven barriers, restrictions from COVID-19 and club training cancelled were the most common across all activity groups.

There were eight themes on facilitators. These were: coronavirus, time, no school, nothing else to do, stay healthy, going on walks, needed to go out and other. Common facilitators

	for engaging in more PA across all MVPA groups were coronavirus, stay healthy and nothing else to do.
Comments	The participating ASF schools have been exposed to a PA intervention for 6 months (3 schools) and 18 months (3 schools). No socio-demographic information. Low response rate so may not be representative of wider population. Study carried out early in pandemic.

Parents' perspectives

CHARACTERISTIC	SUMMARY
Reference	Chua K-P, DeJonckheere M, Reeves SL, Tribble AC, Prosser LA. Factors Associated with School Attendance Plans and Support for COVID-19 Risk Mitigation Measures Among Parents and Guardians. Acad Pediatr 2020. doi:10.1016/j.acap.2020.11.017.
Aims	To determine factors associated with plans for in-person school attendance during the 2020–2021 school year
Study design/setting	Cross-sectional; online survey; June 2020
Population	Parents and guardians of public school children in Illinois, Michigan, and Ohio
Country	US
Method	Recruitment: respondents were invited from a panel of individuals who volunteer to take surveys from Qualtrics. State-specific quotas to ensure a minimum amount of representation by sex, age, race/ethnicity, political affiliation, and annual household income were imposed Measures: The survey assessed respondents' demographic characteristics, views on COVID-19, and experiences with severe COVID-19 illness. Respondents reported whether they planned to send their children to school for in-person classes during the 2020–2021 school year, assuming in-person classes were offered. Respondents reported whether each

	<p>child had an individualized education plan (IEP) and any health conditions. For children with health conditions, respondents reported whether they believed the conditions increased the risk of severe COVID-19 illness.</p> <p>Respondents reported their support for 15 risk mitigation measures. These include 6 measures focused on limiting contact between students (decreasing the number of students allowed on buses, alternating between in-person and online classes, staggering arrival and pick-up times, eating meals in classrooms instead of cafeterias, closing playground structures, and stopping all extracurricular school programs); 4 measures focused on testing and screening for COVID-19 (daily temperature checks for students, requiring COVID-19 testing for all students in a classroom if a classmate tests positive, randomly testing school staff once per week for COVID-19, and randomly testing students once per week for COVID-19); and 5 measures focused on mandatory face coverings for school staff, students in 6th grade and above, students in 3rd–5th grade, students in 1st–2nd grade, and students in kindergarten.</p> <p>Analysis: linear regression models with standard errors clustered at the level of respondents.</p>
Results	<p>1,193 parents/caregivers took part; 2,202 children were included in the child-level analysis and 1,126 respondents were included in the respondent-level analysis.</p> <p>Of the 2,202 children, in-person school attendance was planned for 1,563 (71.0%). This proportion was higher for children of White/non-Hispanic respondents (75.5%) than for children of non-White respondents (54.1%–65.5%). For children in households with annual income of \$0 to \$49,999 and ≥\$100,000, in-person school attendance was planned for 65.7% and 79.3%, respectively.</p> <p>Factors associated with a lower probability of plans for in-person school attendance included being of Black and Asian race/ethnicity compared with White/non-Hispanic; presence of a perceived high-risk health condition compared with no high-risk condition; and employment status of stay-at-home parent/guardian compared with fulltime/part-time employment. Other factors associated with a lower probability included respondent age ≥55 years (vs 18–34 years), political affiliation other than Republican, belief that the chance of someone in the household contracting COVID-19 in the next 2 months was</p>

	<p>moderate or high (compared with no or low chance), and being very concerned about the impact of COVID-19 on the family's financial well-being (compared with not concerned).</p> <p>Factors associated with a higher probability of plans for in-person school attendance included presence of an IEP. Factors not found to be associated with plans for in-person school attendance included urban/rural residence, household income, respondent education, and experience with severe COVID-19 illness.</p> <p>The measures with the lowest support and highest opposition were stopping all extracurricular school programs and closing playground structures. The measure with the highest support and lowest opposition was daily temperature screens of students. Support for mandatory face coverings for school staff and older students was higher than support for mandatory face coverings for younger students.</p> <p>Factors associated with higher number of measures supported included being of Black, Hispanic, and Asian race/ethnicity (compared with White/Non-Hispanic), annual household income \geq\$100,000 (compared with \$0–\$49,999), Democratic political affiliation (compared with Republican), having a master's/professional/doctorate degree (compared with high school diploma/GED or less), experience with severe COVID-19 illness, belief that the chance of someone in the household contracting COVID-19 in the next 2 months was moderate or high (compared with no or low chance), being somewhat or very concerned about the impact of COVID-19 on the family's financial well-being (compared with not concerned), having \geq1 child with a perceived high-risk health condition, and having \geq1 child with an IEP.</p> <p>Factors associated with lower numbers of measures supported included residence in Michigan or Ohio (compared with Illinois) and female sex.</p> <p>Factors not associated with the number of measures supported included respondent age, urban/rural residence, and employment status.</p>
Comments	<p>Recruitment process introduces a source of bias. Not representative of wider population. Compared with parents and guardians of school-aged children in Illinois, Michigan, and Ohio in the 2018 American Community Survey, the 1126 respondents in the respondent-level analysis were slightly more likely to be aged 18 to 44 years, female, white/non-</p>

	Hispanic, and more likely to have annual household incomes between \$50,000 and \$99,999. Surveyed during first wave of pandemic.
CHARACTERISTIC	SUMMARY
Reference	Gilbert LK, Strine TW, Szucs LE, Crawford TN, Parks SE, Barradas DT, et al. Racial and Ethnic Differences in Parental Attitudes and Concerns About School Reopening During the COVID-19 Pandemic – United States, July 2020. MMWR Morb Mortal Wkly Rep 2020; 69:1848–52. doi:10.15585/mmwr.mm6949a2.
Aims	To assess parental attitudes and concerns about school reopening during the COVID-19 pandemic
Study design/setting	Cross-sectional survey; 8-12 th July 2020
Population	Parents (≥ 18years) with school-aged children
Country	US
Method	<p>Data from three online CARAVAN omnibus national surveys conducted among U.S. adults aged ≥18 years during July 8–12 by ENGINE Insights were analysed. Each survey included approximately 1,000 adults. Quota sampling was conducted by ENGINE Insights to select respondents, and statistical weighting was used during analysis to match the 2019 edition of the Current Population Survey proportions, so that the sample represented the U.S. population by sex, age, region, race/ethnicity, and education. Parents were asked about their attitudes and concerns regarding school reopening. The survey was only administered in English.</p> <p>Analysis: Weighted response percentages, p-values, and 95% confidence intervals were calculated, overall and by race/ethnicity. Unadjusted weighted logistic regression was used to test for differences in responses between racial/ethnic groups</p>

Results

858 parents with school aged children living in the household were included in the analysis. 55.6% were White, 13.2% were Black, 24.4% were Hispanic, and 6.7% were non-Hispanic, other race. 38.0% of parent respondents held less than a high school education, 20.4% had some college or technical school education, and 41.6% held a bachelor's degree or higher.

62.3% of White parents strongly or somewhat agreed with the statement that schools should reopen in-person for all students in the fall, a smaller percentage of Black (46.0%, $p = 0.007$) and Hispanic parents (50.2%, $p = 0.014$) agreed.

When asked about schooling preferences until a COVID-19 vaccine is available, 82.4% of Hispanic parents strongly or somewhat agreed that they would prefer to home school their children until a vaccine is available, compared with 69.8% of White parents ($p = 0.006$) and 64.7% of parents of other racial/ethnic groups ($p = 0.012$).

Two thirds (67.6%) of White parents agreed that the overall experience of being in school is more important for students, despite ongoing COVID-19 concerns, significantly fewer Hispanic parents (53.9%, $p = 0.005$) and parents of other racial/ethnic groups (53.4%, $p = 0.044$) felt this way.

Overall, the majority of parents (85.7%) agreed or strongly agreed that they were concerned about students complying with mitigation. Reported concern about students complying with mitigation was significantly higher among parents of other racial/ethnic groups.

The majority of parents (89.4% overall) were concerned about the quality of their children's education being negatively affected by the COVID-19 pandemic, with no statistically significant differences between racial and ethnic groups.

Parents of other racial/ethnic groups were more likely to be very or somewhat concerned about schools opening safely in the fall (98.8%) than were White (86.0%, $p = 0.012$) and Hispanic (86.0%, $p = 0.014$) parents. Black parents were also more likely to be very or somewhat concerned about schools reopening safely in the fall (93.5%) compared with White parents (86.0%, $p = 0.049$).

Overall, the majority of parents were very or somewhat concerned about their child contracting COVID-19 (86.3%) or bringing COVID-19 home (86.3%) as a result of

	<p>attending school. More Black parents were very or somewhat concerned about their child bringing home COVID-19 from school (92.7%) than were White parents (84.5%, $p = 0.050$).</p> <p>Although most parents supported mask mandates (68.3%), fewer White parents were supportive of a mask mandate for students and staff members (62.5%) than were Hispanic parents (79.5%, $p = 0.026$) and parents of other racial/ethnic groups (66.9%, $p = 0.041$).</p>
Comments	<p>It is not known what the community prevalence of the virus was when respondents took part, which may have shaped attitudes. The recruitment process introduces a potential source of bias – the panel sample was incentivised opt-in. The survey was administered in English only. It was not possible to analyse the information to differentiate differences in age of the child.</p>

Child maltreatment

CHARACTERISTIC	SUMMARY
Reference	Gunn H, McCormack S. COVID - 19: Impact on Intimate Partner Violence and Child Maltreatment : A summary of evidence. Ottawa: CADTH; 2020.
Aims	<p>Research questions:</p> <ol style="list-style-type: none"> i) What has been the impact of the COVID-19 pandemic and its associated public health restrictions on outcomes related to intimate partner violence and child maltreatment? ii) What has been the impact of the COVID-19 pandemic on risk factors for violence (e.g., substance use; food insecurity; unemployment)? iii) What has been the impact of the COVID- 19 pandemic on access to support for those at risk of intimate partner violence and child maltreatment (e.g., access to prevention services; social support; health care, support phone lines)? iv) What measures were introduced to mitigate the risk of child maltreatment and intimate partner violence during periods of public health restrictions during the COVID-19 pandemic?

Study design	Rapid review
Search strategy	MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were COVID-19 and domestic violence.
Inclusion criteria	<ul style="list-style-type: none"> • Reported: <ul style="list-style-type: none"> ○ Outcomes on intimate partner violence and child maltreatment ○ Risk factors for violence (e.g., substance use; food insecurity; unemployment) ○ Access to support for risk of intimate partner violence and child maltreatment ○ Measures to mitigate risk of intimate partner violence and child maltreatment • Studies conducted in Australia, Canada, New Zealand, the US, the UK, or a member of the European Economic Area.
Exclusion criteria	<ul style="list-style-type: none"> • Duplicate publications • Not published in English • Published prior to 2020 • Did not outline results specific to COVID-19 or were assumptions based on past pandemics. • Systematic reviews in which all relevant studies were captured in other more recent or more comprehensive systematic reviews. • Primary studies retrieved by the search were excluded if they were captured in one or more included systematic reviews.
Countries	Non-randomised studies: USA (n=16), UK (n=3), Australia (n=2), Mexico (n=1), Switzerland (n=1), Canada (n=1)

Method	One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria. Full texts of study publications were reviewed. The methodological quality of the included studies was not assessed
Results	<p>25 publications met the inclusion criteria and were included in this report. These comprised one systematic review and 24 non-randomized studies.</p> <p>Qi) 21 non-randomized studies and one systematic review met the inclusion criteria with 18 addressing intimate partner violence and 4 addressing child maltreatment. Fourteen of the studies took place in the US, three took place in the UK, one took place in Mexico, and two took place in Australia. The systematic review included studies from multiple locations including the US, England, Poland, and China. Overall, the evidence regarding the impact of the COVID-19 pandemic and its associated public health restrictions on outcomes related to intimate partner violence and child maltreatment is inconclusive. Regarding intimate partner violence, seven publications found evidence suggesting an increase, 3 publications found evidence suggesting a decrease, 2 publications found evidence suggesting there was no change and 6 publications found mixed results. Regarding child maltreatment, one publication found evidence suggesting an increase and three publications found evidence suggesting a decrease. Of the studies reporting decreases or mixed outcomes related to intimate partner violence and child maltreatment, many hypothesized that the reduction in reported intimate partner violence and child maltreatment outcomes may not be reflective of what is occurring, and rather a reflection of the difficulty and dangers associated with accessing support services during the COVID-19 pandemic.</p> <p>Qii) Two non-randomized studies and one systematic review met the inclusion criteria specific to this research question. One of the studies took place in the United States and one took place in Canada. The systematic review included studies from multiple locations including the US, England, Poland, and China. All the publications identified that addressed the impact of the COVID-19 pandemic on risk factors for violence reported an increase in the risk factors assessed, such as substance abuse, parental stress, financial stress, and social pressures. The evidence demonstrated an association between the risk factors assessed and an increased potential for intimate partner violence and child maltreatment.</p>

- Qiii) Four non-randomized studies met the inclusion criteria specific to this research question. One of the studies took place in Switzerland, two took place in the United States and one took place in Australia. These four studies reported difficulties in the provision and access of a range of services. These services included addressing the role that school personnel play in identifying child maltreatment cases, difficulties providing counselling, difficulties providing economic assistance, difficulties providing child protection services, and the restricted ability to use community, online, and telephone resources safely.
- Qiv) Two non-randomized studies met the inclusion criteria specific to this research question. One of the studies took place in the United States and one took place in Australia. Evidence was found regarding a variety of service adjustments to mitigate the risk of child maltreatment and intimate partner violence. The services identified included: telehealth support and remote delivery, increased awareness and education through fact sheets, social media and other communication platforms, smartphone applications, attempts to address privacy concerns in domestic violence situations, and the integration of family services into the essential services still open in the area. The effectiveness of these measures was not assessed.

APPENDIX 3: Excluded studies

Reference	Exclusion Reason
Ali S.J., Jayaraj G. Psychosocial impact of lockdown among students . European Journal of Molecular and Clinical Medicine 2020;7:686–96.	Wrong country
Bershteyn A, Kim H-Y, McGillen J, Braithwaite RS. Which policies most effectively reduce SARS-CoV-2 transmission in schools? MedRxiv 2020. doi:10.1101/2020.11.24.20237305 .	Modelling study
Best evidence on impact of school closures on the attainment gap Education Endowment Foundation	Published before November 2020
Bracis C, Burns E, Moore M, Swan D, Reeves DB, Schiffer JT, et al. Widespread testing, case isolation and contact tracing may allow safe school reopening with continued moderate physical distancing: A modelling analysis of King County, WA data. Infect Dis Model 2021;6:24–35. doi:10.1016/j.idm.2020.11.003 .	Modelling study
Buonsenso D, Roland D, De Rose C, Vásquez-Hoyos P, Ramly B, Nandipa Chakakala-Chaziya J, et al. Schools Closures during the COVID-19 Pandemic: A Catastrophic Global Situation 2020 . doi:10.20944/preprints202012.0199.v1 .	Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece
Charney SA, Camarata SM, Chern A. Potential Impact of the COVID-19 Pandemic on Communication and Language Skills in Children. Otolaryngol Head Neck Surg 2020:194599820978247. Doi: 10.1177/0194599820978247 .	Commentary or editorial or letter or opinion or position statement or news article or view points

<p>Chia SM, Chang SYS, Roy CS. Effects of nationwide lockdown and school closures during the COVID-19 pandemic on children’s physical health and beyond. Singapore Med J 2020. doi:10.11622/smedj.2020172.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>
<p>Coronado F, Blough S, Bergeron D, Proia K, Sauber-Schatz E, Beltran M, et al. Implementing Mitigation Strategies in Early Care and Education Settings for Prevention of SARS-CoV-2 Transmission — Eight States, September–October 2020. MMWR Morb Mortal Wkly Rep 2020;69. doi:10.15585/mmwr.mm6949e3.</p>	<p>Wrong outcomes</p>
<p>Coronavirus (COVID-19) contingency framework for education and childcare settings GOV.UK</p>	<p>Guidelines</p>
<p>Decisions to allow all learners to return to schools and settings in September: impact assessment GOV.WALES</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>
<p>Drane CF, Vernon L, O’Shea S. Vulnerable learners in the age of COVID-19: A scoping review. Aust Educ Res 2020:1–20. Doi: 10.1007/s13384-020-00409-5.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view points</p>
<p>Education settings: coronavirus testing, contact tracing and NHS COVID-19 app guidance GOV.WALES</p>	<p>Guidelines</p>

<p>Flasche S, Edmunds WJ. The role of schools and school-aged children in SARS-CoV-2 transmission. Lancet Infect Dis 2020. doi:10.1016/S1473-3099(20)30927-0.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>
<p>Hefferon C, Taylor C, Bennett D, Falconer C, Campbell M, Williams JG, et al. Priorities for the child public health response to the COVID-19 pandemic recovery in England. Arch Dis Child 2020: archdischild-2020-320214. Doi: 10.1136/archdischild-2020-320214.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>
<p>Kaiser AK, Kretschmer D, Leszczensky L. Social network-based strategies for classroom size reduction can help limit outbreaks of SARS-CoV-2 in high schools. A simulation study in classrooms of four European countries. MedRxiv 2020. doi:10.1101/2020.11.30.20241166.</p>	<p>Modelling study</p>
<p>Lo Moro G, Sinigaglia T, Bert F, Savatteri A, Gualano MR, Siliquini R. Reopening Schools during the COVID-19 Pandemic: Overview and Rapid Systematic Review of Guidelines and Recommendations on Preventive Measures and the Management of Cases. Int J Environ Res Public Health 2020; 17. Doi: 10.3390/ijerph17238839.</p>	<p>Guidelines</p>
<p>Murray AT. Planning for classroom physical distancing to minimize the threat of COVID-19 disease spread. PLoS ONE 2020;15:e0243345. doi:10.1371/journal.pone.0243345.</p>	<p>Wrong age group</p>
<p>Patel S, Epalza Ibarrodo C, Toubiana J, Van der Linden D. Urgent need to develop evidence-based COVID-19 recommendations for primary schools. Arch Dis Child 2020. doi:10.1136/archdischild-2020-321017.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>

<p>Rapid Assessment of COVID-19 impact on education in Bulgaria UNICEF Europe and Central Asia</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point or discussion piece</p>
<p>Richardson D, Carraro A, Cebotari V, Gromada A (2020). Supporting Families and Children Beyond COVID-19: Social protection in high-income countries, <i>Innocenti Research Report</i> Florence: UNICEF Office of Research – Innocenti.</p>	<p>Wrong outcomes</p>
<p>Rozhnova G, van Dorp CH, Bruijning-Verhagen P, Bootsma MCJ, van de Wijgert JHHM, Bonten MJM, et al. Model-based evaluation of school- and non-school-related measures to control the COVID-19 pandemic. <i>MedRxiv</i> 2020. doi:10.1101/2020.12.07.20245506.</p>	<p>Modelling study</p>
<p>Sebastiani G, Palù G. COVID-19 and School Activities in Italy. <i>Viruses</i> 2020;12. doi:10.3390/v12111339.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view points</p>
<p>Yang J, Zhang Q, cao zhidong, gao J, Pfeiffer D, Zhong L, et al. The impact of non-pharmaceutical interventions on the prevention and control of COVID-19 in New York City. <i>MedRxiv</i> 2020. doi:10.1101/2020.12.01.20242347.</p>	<p>Modelling study</p>

**COVID-19 in Children and Young People:
Literature Scanning Report 7
(6.11.20-27.11.20)**

Research question

What is the current knowledge about Covid-19 and children and young people?

Method

The search strategy and inclusion/exclusion criteria are outlined in Appendix 1 (page 20). The titles and abstracts of 100 papers were screened against the agreed inclusion and exclusion criteria for possible inclusion in this report. This screening identified 55 papers for further consideration. The full text of each was assessed and 25 met the inclusion criteria. Details of the included studies can be found in Appendix 2 (page 22) and the excluded studies in Appendix 3 (page 75). In this report, references that are highlighted in **red font** are pre-print publications. Papers that might be of particular interest and/or to raise awareness to the advisory group are highlighted in **purple font** and listed on page 2. Hyperlinks to the original articles are included.

Key messages

- The evidence base about children and young people's role in the transmission of SARS-CoV-2 continues to develop. For example, a systematic review of studies, that reported child-to-child and/or child-adult transmission, found that transmission of SARS-CoV-2 was higher in household settings than in other community settings, including schools.
- The impact of the pandemic and the public health control measures on children and young people's physical and mental health are a field of considerable research activity. There is emerging evidence that younger children, at least in the short term, have been adversely affected. For example, in a qualitative study, primary school staff in Wales observed, on the phased re-opening of schools in the summer term, some pupils' weight gain, anxiety, low mood and social disconnection. They felt that inequalities in learning, health and wellbeing had widened during the school closures.
- Likewise, early years providers in England felt that children's learning and development had been affected. While some children had thrived while at home during lockdown with improvements in language and communication skills highlighted, others had returned to the early years' setting using nappies and dummies at an older age than providers might have expected. Many children appeared more anxious and had struggled to separate from their parents.

Reports of potential interest

Papers included in this report

- Suk JE, Vardavas C, Nikitara K, Phalkey R, Leonardi-Bee J, Pharris A, et al. [The role of children in the transmission chain of SARS-CoV-2: a systematic review and update of current evidence. MedRxiv 2020. doi:10.1101/2020.11.06.20227264.](#)
- OFSTED. [COVID-19 series: briefing on early years, October 2020.](#) Manchester: OFSTED; 2020.
- Sherr L, Cluver L, Tomlinson M, Idele P, Banati P, Anthony D, et al. [Beyond Masks: Societal impacts of COVID-19 and accelerated solutions for children and adolescents.](#) Florence: UNICEF Office of Research – Innocenti; 2020.
- [Scottish Government. COVID-19: Children, young people and families October 2020 Evidence Summary.](#) Scottish Government; 2020.

Papers not included in this report

The following studies and reports did not meet the inclusion criteria for this report. Nevertheless, they may be of interest to the advisory group.

Modelling study

- Murras S, Cohen-Addad V, Duboc G, Dupre la Tour M, Frasca P, Mathieu C, et al. [Analysis of mitigation of Covid-19 outbreaks in workplaces and schools by hybrid telecommuting. MedRxiv 2020. doi:10.1101/2020.11.09.20228007.](#)

A simulation study to analyse Covid-19 transmission on three real-life contact networks from a workplace, a primary school and a high school in France, gathered by SocioPatterns, was developed to assess the impact of organization strategies.

Transmission

- Thompson H, Mousa A, Dighe A, Fu H, Arnedo-Pena A, Barrett P, et al. [Report 38: SARS-CoV-2 setting-specific transmission rates: a systematic review and meta-analysis. Imperial College London 2020. doi:10.25561/84270.](#)

A systematic review conducted to estimate the secondary attack rate (SAR) and observed reproduction number (R_{obs}) in different settings and to explore differences by age, symptom status, duration of exposure and household size.

- Waterfield T, Watson C, Moore R, Ferris K, Tonry C, Watt A, et al. [Seroprevalence of SARS-CoV-2 antibodies in children: a prospective multicentre cohort study. Arch Dis Child 2020. doi:10.1136/archdischild-2020-320558.](#)

The objective of this study was to report the presence of SARS-CoV-2 antibodies, consistent with previous infection. This multicentre observational cohort study, conducted from 16 April to 3 July 2020 at five UK sites, recruited children of healthcare workers, aged 2–15 years. Participants provided blood samples for SARS-CoV-2 antibody testing and data were gathered regarding unwell contacts and symptoms.

Guidance

- [Government of Canada. Evaluating COVID-19 disease transmission and public health measures in schools: Outbreak investigation guidance. 2020.](#)
- [National Academies of Sciences, Engineering, and Medicine; Committee on Guidance for K-12 Education on Responding to COVID-19. Reopening K-12 Schools during the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities. Washington \(DC\): National Academies Press \(US\); 2020. doi:10.17226/25858.](#)

Other papers

- [Grove G, Ziauddeen N, Alwan NA. Symptoms suggestive of COVID-19 in households with and without children: a descriptive survey. *MedRxiv* 2020. doi:10.1101/2020.11.09.20228205.](#)

This study aimed to characterise the nature and duration of symptoms suggestive of COVID-19 in U K households, and examine whether the symptoms varied between households with and without children and between adults and children from March to May 2020 in the UK.

- [UNICEF. Averting a lost COVID generation A six-point plan to respond, recover and reimagine a post-pandemic world for every child.](#)
- [The impact of COVID-19 on education: Insights from Education at Glance 2020 – Digital Inclusion Atlas](#)
- [Scottish Government](#)
 - [Coronavirus \(COVID-19\): impact of restrictions on children and young people - CRWIA - stage 3](#)
 - [Coronavirus \(COVID-19\): impact on children, young people and families - evidence summary September 2020](#)
 - [Coronavirus \(COVID-19\): impact on children, young people and families - evidence summary July 2020](#)
 - [Coronavirus \(COVID-19\): impact on children, young people and families - evidence summary June 2020](#)
- [Wales Government Technical Advisory Group: evidence review on children and young people under 18 in preschool, school or college following the firebreak](#)

Findings

The included studies can be categorised into four broad topic areas:

- a) Transmission (n=8)
- b) Health and wellbeing (n=14)
- c) Parents' perspectives (n=2)
- d) Inequality (n=1)

Transmission

Eight studies that examined aspects of the role of children and young people in the transmission of SARS-CoV-2 met the inclusion criteria for this review. There were two reviews of international research and six individual studies from Germany (n=2), England, Spain, Italy and Belgium.

International reviews

In a review of international studies, Suk et al¹ aimed to assess the role of children in the transmission of SARS-CoV-2 to other children and/or adults, as well as examining the potential role of school closures on community transmission. Twenty-two studies met the inclusion criteria; fourteen observational studies reported on child-to-adult transmission and eight looked at the impact of school closure. Seven out of the eight school closure studies were based on mathematical modelling and various assumptions of infectivity in the first months of the pandemic. Of the fourteen observational studies, six assessed transmission in a school setting and two reported on regional evidence after the re-opening of schools.

The authors' found that the available evidence suggested that children can be infected by and transmit SARS-CoV-2 in household and community settings. Transmission of SARS-CoV-2 was found to be higher in household settings than in other community settings. In the included studies, the secondary attack rate, when younger children were identified as the index case appeared to be lower than when older children or adults were the index case. There was limited information about transmission within school settings.* The included studies examined a relatively small number of cases, perhaps, as a reflection of the low overall community prevalence of the virus when the studies were carried out.

D'Angelo et al² examined the reporting of lockdown exit strategies for workplace and education settings during the COVID-19 or similar pandemics in a scoping review.[†] School settings were included in 21 reports that met the inclusion criteria of the review; two observational studies which looked at an influenza outbreak in US (published in 2014) and SARS-CoV-2 in China in March 2020, one expert consensus, ten mathematical modelling studies and eight

* The primary studies included in this review are the same as those included in previously reported reviews.

† Only the findings that were in keeping with the evidence scanning report agreed inclusion criteria were extracted

editorials/commentaries. The authors suggest that, in the main, lockdown exit strategies were based on general criteria that acted like guiding principles. Based on the observational studies and the expert consensus, the authors suggest that the guiding principles, in relation to schools settings, include low community prevalence of the virus, use of non-medical face coverings, social distancing, testing and contact tracing. The findings of this review should be interpreted with a degree of caution, however, as editorials and commentaries were included alongside empirical studies and given equal weighting in the findings. In addition, the observational studies were not quality assessed.

Germany

In the first German study, Hippich et al³ used a two-stage population-based screening for SARS-CoV-2 using capillary blood from children (aged 1-18 years) taking part in a type-1 diabetes screening programme (n=15,771) as well as neonatal dried blood spots (n=1,916). Blood samples were tested for IgG antibodies to the virus' receptor-binding domain (RBD) and any samples that tested positive were tested for antibodies to a second anti-genic protein. Dual positivity was observed in 82 children taking part in the screening programme between January and July. Between April and July 2020, the overall seropositivity rates for SARS-CoV-2 was found to be 0.87% in children and 0.47% in neonates. This was considerably higher than the incidence of the health authority reported SARS-CoV-2 cases. No statistically significant difference in antibody frequency between children aged 0 to 6 years (66 of 7,821, 0.84%) and children aged 7 to 18 years (14 of 1,425, 0.98%; p = 0.72) was detected.

Parents of children enrolled between April and mid-July were asked to complete questionnaires about previous SARS-CoV-2 virus positivity and symptoms (n=4,859). Of these children, 46 were found to have dual positivity for SARS-CoV-2; 22 (47.8%) did not report symptoms, and 11 (24%) were reported to have had no symptoms and no family member with a positive COVID-19 test.

In the second German study*, von Bismarck-Osten et al⁴ used routinely collected information to examine the effect of school closures on the SARS-CoV-2 infection rates in children (5-14 years) as well as adults in different age groups. By applying an innovative approach that used modern econometric tools, the authors aimed to identify the causal effects of staggered summer school holidays in sixteen states in Germany. School closures for the summer holidays appeared to have had little impact on SARS-CoV-2 infections among children and adults. However, prior to holidays, schools were operating at a half capacity and the overall community prevalence of the virus was low. Infection rates tended to increase in the last weeks of the school holidays and the return to full-time school after the holidays was not found to be linked with an increase in

* With thanks to Tonje Laird, Health Protection, who provided the review of this paper

infections among children. The authors attribute that the observed increases to travel returnees and increased testing. However, the methodology used in this study is not supported by robust evidence of reliability. The analysis was limited to school-aged children aged younger than 15 years. Older school-aged children were included in an adult population group (15-34 years).

England

In England, Ladhani et al⁵ aimed to estimate the secondary attack rate using SARS-CoV-2 seropositivity in children of health care workers with a laboratory-confirmed positive test.* Parents who were health care workers in London were recruited by email invitation. Families (n=126) with 215 children took part. Nasal swabs for RT-PCR assay and venous blood specimens for SARS-CoV-2 IgG were taken. At least one parent in twenty-one families reported having developing COVID-19 symptoms and tested positive either by RT-PCR (n=19) at the time or by serology (n=2) a few weeks later. In nine families (out of 21) with a positive parent, at least one child tested positive for SARS-CoV-2 IgG. There was evidence of family clustering with a secondary attack rate of 95.2% in the nine families who had at least one seropositive child, compared to none of the 23 children in the other twelve families. There was no significant differences in family size, ethnicity, and source of infection or degree of self-isolation by the index case between families with or without seropositive children. However, the children in the seropositive families were more likely to be older, male and have a history of COVID-19-like illness during the time between their parent's illness and the anti-body test. It is not known, however, if the children involved in this study had continued to attend school.

Spain

Families with at least one child (younger than 15 years) living in the same household with an adult case of laboratory-confirmed SARS-CoV-2 were recruited, through the web platform of a tertiary-level children's hospital, to assess the seroprevalence of SARS-CoV-2 in household members.⁶ Researchers interviewed, by telephone, every first-reported adult case twenty-four hours after a positive RT-PCR test to collect epidemiological and clinical information about household members. Finger-prick capillary blood samples for rapid Lateral Flow Assays for SARS-CoV-2 IgG and/or IgM were taken from household contacts.

Researchers followed up 410 family households out of 1,359 cases that met the inclusion criteria. Complete information was received from 381 family households. Among 1,084 household contacts of the adult first reported cases, 672 were children (aged up to 15 years) and 412 were adults (15 years and older). Of these, 195 (18.1%) were found to be SARS-CoV-2 seropositive by

* Part of the RAPID-19 study which has recruited children of health care workers in five UK cities. This report focuses on the London cohort.

lateral flow assay; 118 were children and 77 were adults. The difference in SARS-CoV-2 seroprevalence rates between children and adult contacts was not found to be statistically significant. With the exception of one child, child contacts were reported to be mildly symptomatic or asymptomatic. The use of public rather than private transportation to school, before the national lockdown was implemented, was found to be strongly associated with children being seropositive. In this study, however, the method of recruitment introduces a source of bias. The majority (68.9%) of the first reported cases were health care workers. It is not clear from this report how the family households from those that were eligible were selected for follow-up by the researchers.

Italy

In one region of Italy, Larosa et al⁷ aimed to describe the secondary transmission of SARS-CoV-2 among pupils and school staff after the re-opening of pre-schools and schools. In this study, when a positive case (child or adult) associated with a school was detected, everyone in the class was immediately tested. During the study period (1st September to 15th October), 43 index cases (38 children and 5 teachers) were identified, associated with 41 classes in 36 schools (eight pre-schools, ten primary and 18 secondary schools). In total, 994 pupils and 204 teachers were tested. Among the children, 39 (3.9%) secondary cases in 13 classes were identified. The secondary attack rate was higher in secondary schools (6.64%) than in primary schools (0.44%), while no secondary cases were found in pre-school settings. No secondary cases among tested school staff members were found. During the study period, schools had adopted a number of measures designed to reduce transmission of the virus.

Belgium

Building on an ongoing study that monitors changes in the proportion of pneumococcal serotypes in children (aged 6-30 months) attending day care centres in Belgium, Desmet et al⁸ analysed the nasopharyngeal swabs taken from participating children during 2nd-12th March using RT-PCR for SARS-CoV-2. Swabs from 84 children attending eight different day care centres were analysed. All tested negative for SARS-CoV-2. It is not known what the community prevalence of SARS-CoV-2 was at the time of the study as reliable information was not available at the time. In this report, there is limited demographic information given, so it is not possible to tell if the children taking part were representative of the wider population.

¹ Suk JE, Vardavas C, Nikitara K, Phalkey R, Leonardi-Bee J, Pharris A, et al. The role of children in the transmission chain of SARS-CoV-2: a systematic review and update of current evidence. *MedRxiv* 2020. [doi:10.1101/2020.11.06.20227264](https://doi.org/10.1101/2020.11.06.20227264).

² D'angelo D, Sinopoli A, Napoletano A, Gianola S, Castellini G, Del Monaco A, et al. Strategies to exiting the COVID-19 lockdown for workplace and school: A scoping review. *Saf Sci* 2021; 134:105067. [doi:10.1016/j.ssci.2020.105067](https://doi.org/10.1016/j.ssci.2020.105067).

³ Hippich M, Holthaus L, Assfalg R, Zapardiel Gonzalo JM, Kapfelsperger H, Heigermoser M, et al. Public health antibody screening indicates a six-fold higher SARS-CoV-2

exposure rate than reported cases in children. *Med (N Y)* 2020.

[doi:10.1016/j.medj.2020.10.003](https://doi.org/10.1016/j.medj.2020.10.003).

⁴ von Bismarck-Osten C, Borusyak K, Schönberg U. [The Role of Schools in Transmission of the SARS-CoV-2 Virus: Quasi-Experimental Evidence from Germany](#). London: Centre for Research and Analysis of Migration, University College London; 2020.

⁵ Ladhani SN, Andrews N, Aiano F, Baawuah F, Amin-Chowdhury Z, Brown KE, et al. Secondary attack rate and family clustering of SARS-CoV-2 infection in children of healthcare workers with confirmed COVID-19. *Clin Infect Dis* 2020.

[doi:10.1093/cid/ciaa1737](https://doi.org/10.1093/cid/ciaa1737).

⁶ Brotons P, Launes C, Buetas E, Fumado V, Henares D, de Sevilla MF, et al. Susceptibility to Sars-COV-2 Infection Among Children And Adults: A Seroprevalence Study of Family Households in the Barcelona Metropolitan Region, Spain. *Clin Infect Dis* 2020. [doi:10.1093/cid/ciaa1721](https://doi.org/10.1093/cid/ciaa1721).

⁷ Larosa E, Djuric O, Cassinadri M, Cilloni S, Bisaccia E, Vicentini M, et al. Secondary transmission of COVID-19 in preschool and school settings after their reopening in northern Italy: a population-based study. *MedRxiv* 2020.

[doi:10.1101/2020.11.17.20229583](https://doi.org/10.1101/2020.11.17.20229583).

⁸ Desmet S, Ekinçi E, Wouters I, Decru B, Beuselinck K, Malhotra-Kumar S, et al. No SARS-CoV-2 carriage observed in children attending daycare centers during the first weeks of the epidemic in Belgium. *J Med Virol* 2020. [doi:10.1002/jmv.26689](https://doi.org/10.1002/jmv.26689).

Health and wellbeing

There were fourteen reports that examined aspects of children's health and wellbeing that met the inclusion criteria. The first two reports focus on wider impacts of the pandemic on children's health and wellbeing drawing on a variety of sources. The remaining studies focus on elements of mental health (n=5), physical health and wellbeing (n=2), and learning, development and wellbeing (n=5).

Wider impacts

International

The 'Beyond Masks' report published by UNICEF looks at international literature about the wider impacts of COVID-19 on children and adolescents.⁹ Rapid evidence reviews were undertaken using available evidence from the COVID-19 pandemic as well as from previous epidemics (HIV/AIDS, tuberculosis, Ebola, Zika). The findings suggest that the direct health impact of COVID-19 on children and adolescents is generally lower than for adults. Children living with HIV and other chronic illness may be particularly at risk of COVID-19. In addition, there is a concern that responses to the pandemic may limit access to regular child-related healthcare services such as immunisation, maternity and neonatal care. Lockdowns were considered to be likely to be associated with decreased levels of physical activity among children and adolescents with negative consequences for health and wellbeing. Disruptions to social networks and relationships and social isolation can have numerous adverse effects on children and adolescents. Access to safe, quality and affordable childcare was seen as a vital source of support for children during the pandemic.

United Kingdom

Scottish Government's Children and Families Analytical Unit's report aims to summarise the impact of COVID-10 on the wellbeing of children and families by using a non-systematic selection of evidence sources from Scotland and the rest of the United Kingdom.¹⁰ The focus in this report is mainly survey reports, published mainly in September 2020, rather than peer-reviewed publications.

Evidence suggests that key issues for young people, as they came out of lockdown, were concerns about COVID-19 transmission, adapting to the mitigation measures in school and worries about the future. Emerging evidence suggests that some children have experienced a loss of opportunities to play and take part in regular peer interaction; younger age groups appear to be at greatest risk. However, for some children with special education needs, school closures were reported to have had a beneficial effect on their anxiety levels.

There are increasing concerns about the impact of rising poverty on the wellbeing of children and families, with worsening financial situations having a detrimental effect on mental health. From wider United Kingdom sources, the negative impact of digital exclusion, overcrowding and/or poor quality housing and lack of outdoor space on families' wellbeing continued to be common themes. Children who are care leavers have been identified as group who are at most risk of mental health impacts due to experiences of loneliness and social isolation during lockdown, exacerbated by lack of digital access.

During lockdown, there is Scottish evidence that services received reports of children being exposed to increased levels of abuse. In addition, there is emerging evidence from the United Kingdom which suggests that there was an increase in online bullying as well as reports of increases in online sexual abuse.

Mental health

International Review

To assess the impact of the COVID-19 pandemic on the mental health of children and adolescents (aged 18 years and younger), Nearchou et al¹¹ carried out a systematic review of peer-reviewed studies. Twelve studies, from China (n=7), Italy (n=s), Poland (n=1), Turkey (n=1) and USA (n=1), met the inclusion criteria. Overall, the findings of the included studies suggested that emotional reactions to the pandemic, such as worry and fear about contracting the virus, as well as the public health control measures were associated with negative mental health outcomes in children and young people. The findings of this review should be interpreted, however, with a degree of caution, as it is possible that the search terms used, particularly those in relation to COVID-19, may have missed relevant publications. No comparisons were made to the prevalence of mental health difficulties in pre-COVID populations of the same age groups. The synthesis focuses mainly on descriptions of the individual studies.

United Kingdom

The Co-SPACE project is tracking the mental health of school-aged children and young people aged 4-16 years throughout the COVID-19 pandemic.¹² Parents have been recruited through a variety of means including social media, distribution through partner organisations, networks and charities, the media and targeted online advertising. An online survey is being sent out to participating parents/carers and young people (if aged 11-16 years) on a monthly basis throughout. This report presents outcomes measured by the conduct problems, emotional symptoms and hyperactivity/inattention subscales of the Strengths and Difficulties Questionnaire (SDQ). Participants (n=7,192) were parents/carers who had completed the survey at least once between 30th March and 31st October.

Overall, parent/carer-reported behavioural and attentional difficulties increased from March to June before decreasing in July onwards. Similarly, reported emotional problems decreased overtime after lockdown restrictions began to ease. On average, parents/carers reported higher levels of behavioural and attentional difficulties for boys than girls. However, higher levels of emotional problems were reported for girls. Overtime, the patterns of behavioural, emotional and attentional difficulties were broadly similar for boys and girls. On average, parents/carers reported higher levels of behavioural and attentional difficulties for primary than secondary school aged children. Levels of emotional problems were similar for both groups.

Parents/carers reported, on average, considerably higher levels of behavioural, attentional and emotional difficulties for children with special educational needs and/or neurodevelopmental differences than children without. For children with special educational needs and/or neurodevelopmental differences levels of difficulties remained stable during the study period. In contrast, for children without special educational needs and/or neurodevelopmental differences reported difficulties increased from March to June and then decreased from July onwards.

Parents/carers living in low-income* households reported, on average, higher levels of behavioural, attentional and emotional difficulties than those in households with a higher annual income. Increases in behavioural difficulties were reported from July to August by parents/carers in low-income households but not by those in households with a higher income. It should be noted, however, that this sample is not nationally representative. Respondents are typically from high-income, white British households, and parents/carers were working full- or part-time. Information from Co-SPACE participants living in Scotland were not included in this report.

* <£16,000 pa

Italy

Using standardised questionnaires in an online survey, Cusinato et al¹³ examined parental wellbeing* and stress[†] as well as their children's wellbeing[‡] and resilience[§] during the first wave of the COVID-19 pandemic in Italy. Complete responses were received from 463 parents/carers with children aged 5-17 years living at home. Mothers reported lower levels of wellbeing, perceived self-control and higher levels of anxiety compared to Italian normative values. Their wellbeing was found to be significantly linked with changes in parents' working conditions, the child's age and parental health problems. No statistically significant differences in parental stress was found between parents with older (13-17 years) and younger (5-12 years) children. Higher stress levels were linked with being in a lone parent household, having experienced a change in working conditions, living with children with physical and/or psychological difficulties and having more children living at home.

No statistically significant differences was found between the total scores of the Strengths and Difficulties Questionnaire in children aged 6-10 years in this sample and Italian normative values. In addition, no statistically significant differences between the scores of younger and older children in the study sample were found. Girls scored higher on the prosocial behaviour subscale. Children's resilience scores were found to be negatively correlated with their Strengths and Difficulties total scores. This is information missing, however, from this study report. It is not possible to tell how the parents were recruited, so it is not known how representative of the wider population the respondents may have been. The data tables are not included so it is not possible to judge the reliability of the authors' interpretation or conclusions.

Greece

Giannopoulou et al¹⁴ examined the impact of the lockdown on the levels of anxiety and depression among final year high school students in Greece. At the time, pupils were preparing for the national university entrance exam. Participants (n=442) were recruited through various means including social media and an email invitation sent to students attending cram schools. Those taking part were asked a mix of bespoke questions and standardised measures** in an online survey. Respondents were asked to complete the measures for a time period before nationwide lockdown (first two weeks of February) and, again, for the previous two weeks (end of April 2020).

* Measured by Psychological General Wellbeing Index

† Measured by Parent Stress Scale

‡ Measured by Strengths and Difficulties Questionnaire

§ Measured by Child and Youth Resilience Measure

** Generalised Anxiety Disorder-7 and the Patient Health Questionnaire-9 modified for teens

There was a significant increase in reported symptoms of depression and anxiety between the two time points with girls scoring significantly higher than boys at both times. The proportion of participants who scored within the severe anxiety and severe depression ranges increased significantly. The proportion that reported having thoughts that they would be better off dead, or hurting themselves in some way also increased. Higher baseline anxiety and depression symptom scores and greater lockdown experienced distressed were linked with higher anxiety and depression levels, respectively, during lockdown. The recruitment process, however, introduces a source of bias. In addition, participants were asked to recall their symptoms of depression and anxiety in February as a baseline.

America

To examine the effects of the COVID-19 pandemic on family functioning and the mental health of caregivers with young children (0-5 years), Davidson et al¹⁵ invited, by email, participants (≈ 2000) in six service programmes in one city in South Eastern America to complete an online survey. In addition, caregivers ($n=26$) were recruited through a neighbourhood centre providing services for Haitian families. Respondents ($n=260$ online, 13% response rate; $n=26$ in-person) were asked a mix of standardised and bespoke questions. Children's psychological wellbeing was assessed using the Strengths and Difficulties Questionnaire.

Almost three quarters of participants (72%) reported increased anxiety, 46% increased sadness/depression, 39% sleep disturbances and 34% reported increased anger. Problems with child behaviour (38%), concerns about schooling from home (42%), having too many responsibilities (56%), and concerns about their child's health (29%) and/or another family member's health (31%) were described. Reported concerns about children's psychological wellbeing were found to be linked with caregivers' mental health and stress related to COVID-19. Greater caregiver COVID-related stress was found to be associated with lower COVID-related self-efficacy, which in turn was linked with poorer mental health outcomes.

The method of recruitment, however, introduces a source of bias which coupled with the low response rate suggests that the participants may not have been representative of the wider population. There are limited data tables in this report which makes it difficult to judge the reliability of the authors' interpretation.

Learning, development and wellbeing

International review

In a rapid review of evidence, Graber et al¹⁶ looked at the impact of quarantine and restricted environments on children's play. Three databases were searched, towards the end of April, using search terms related to children and young

people, quarantine and restricted environments and play and activities. Fifteen studies from America (n=9), Canada (n=2), Australia (n=1), Ireland (n=1), Israel (n=1) and Palestine (n=1) met the inclusion criteria. Studies had been conducted in a variety of restricted environments including hospitals (n=7), juvenile (n=4) and immigration (n=3) detention centres and a refugee camp. None of the included studies examined the impact of social restrictions or quarantine measures, implemented to control an infectious disease outbreak, on children's play.

Nine studies looked at how restricted environments affected children's' play experiences. Adverse impacts on children's access to and frequencies of engaging in play as well as expressiveness and social connectedness through play were all described. Ten studies looked at how play might mitigate the effects of quarantine or restriction of children's outcomes. Play was considered to be a means of expression, a coping strategy as well as a source of support in restricted environments. Unsafe spaces, scarcity of toys, lack of interaction with other children and lack of time outdoors were identified as barriers to play. Lack of opportunities to play were associated with inactivity and boredom among children.

England

Inspectors from The Office for Standards in Education, Children's Services and Skills (OFSTED) carried out telephone interviews in early October with registered early years providers and maintained nursery schools in England to find out how they felt children had been affected by the first national lockdown.¹⁷ The vast majority of participants (n=208) felt that children's learning and development had been affected. Particular concerns were raised about children with special educational needs, those who spoke English as a second language, children living in poverty and/or those with parents that the provider had struggled to engage with prior to lockdown.

Early years providers that had stayed open during lockdown said that children who attended had continued to make the developmental progress they expected. In households where parents had been able to spend quality time with them, children who were at home were felt to have thrived. Improvements in communication and language skills were highlighted. For children at home where parents had been unable to spend that time with them, providers felt some children had not developed their language, communication and physical skills as they might have expected. When children had returned to the early years setting, providers felt that many were more anxious and had struggled to separate from their parents. Some children appeared less confident around others and were slower to join in. Others had returned using nappies, comforters and dummies at an older age than providers would usually have expected.

Providers from private, voluntary and independent nurseries, however, were over-represented in this sample. Their understandings and experiences of how children have been affected may not be representative of the wider population. No information is given about the analysis approach and it is difficult to judge the validity of the findings as there are no supporting quotations in this report.

Scotland

The Children's Parliament in Scotland using a repeated cross-sectional design, surveyed children (aged 8-14 years) in April, May, June and September/early October to capture their experiences during the pandemic.¹⁸ This report compares the results from surveys carried out during the first national lockdown (April-June, n=10,508 combined) with findings from the fourth survey (n=1969) carried out after children had gone back to school. In each, children were asked, on a 5-point scale, whether they agreed or disagreed with a series of thirty-one statements. At the end, there were two open questions where children could identify what they were worried about and what helped them to feel good.

After going back to school, fewer children reported that they enjoyed learning things and that they knew that there were things that they were good at. Younger children were more likely to report that they were proud of things they could do, whereas older children (12-14 years) were less likely to do so. Children reported that they had more fun things to do and they felt less bored. There were statistically significant increases in the numbers of children who strongly agreed or agreed that there were things they worried about in their life. Girls aged 12 to 14 years reported the highest levels of agreement. Overall, nearly a third of children reported that their parents/carers were worried about having enough money. After returning to school, there was an increased number of younger children that highlighted this concern. Worries about their own health and the health of a family members increased, while concerns about how their friends or family were doing decreased. Regardless of their sex or age, children reported that they were less likely to feel safe online. After returning to school, children highlighted that friends were the most likely thing to help them to feel better. Among all children, there was a statistically significant reduction in the numbers of children who strongly agreed or agreed with the statement 'I feel lonely'. However, while only 4% of children indicated, during lockdown, that they didn't have someone to talk to, this increased to 6% in the latest survey.

There is no socio-demographic information, however, given in this report. This means that it is not possible to tell if those taking part in the surveys are representative of the wider population or if the cohort that completed the latest survey had similar characteristics to those that completed the earlier surveys. The data tables are not included so it is not possible to judge the reliability of the authors' findings.

Wales

Primary school staff in Wales were invited to complete an online survey about the logistics of phased re-opening of schools, the experiences of staff about the effects of lockdown and school closures on children in their class or school.¹⁹ Staff (n=208) from 78 primary schools across sixteen local authorities completed the survey; half worked in schools with a proportion of pupils eligibility for free school meals greater than the national average.

Respondents highlighted the importance of prioritising the health and wellbeing of pupils and staff. During the phased re-opening of schools, school staff reported noticing a lack of physical fitness and weight gain among pupils which they attributed to less engagement in physical activity during lockdown. In addition, a marked variation in children's abilities and the support children had received at home was described. Concerns about the regression of key skills and knowledge during school closures were raised. Teachers highlighted that competing household demands for the use of digital technology may have prevented children from engaging with learning. They felt that inequalities in pupils' learning, health and wellbeing were likely to have increased during the school closures.

Participants raised concerns that their own wellbeing had been neglected during the period of school closures and the phased re-opening of schools. They highlighted the challenges of combining work and home life. Lack of contact with other school staff was felt to have contributed. School staff were particularly worried about the potential transmission within the school setting. It is not known, however, how representative of the wider population those taking part in this study were.

Italy and France

Families with children aged between three and sixteen years living in France (n=2154) and Italy (n=3,352) were recruited to take part in a cross-sectional survey.²⁰ Along with socio-demographic information, parents were asked about their and their child's use of time and their views about their child's educational progress during lockdown.

Overall, lockdown was reported by parents to have adversely affected boys' educational progress more than girls. Differences between age groups were found with children attending kindergarten in Italy and secondary school in France being reportedly most affected. Time spent watching television or on the internet doubled in both countries and increases in time spent in front of a screen was linked with lower parental perceptions of educational progress. In the main, parents reported that lockdown had impacted adversely on their child's emotional wellbeing, even though there was a perceived improvement in the quality of the parent-child relationship. In both countries, children living with a lone parents were reported to have a greater reduction in their emotional

wellbeing. Parents were slightly more worried about younger children than those in secondary school. These findings should be interpreted with a degree of caution, however, as the questionnaire used relied on the use of non-standardised questions and parental points of view. The recruitment process is not stated clearly, so it is not possible to tell how representative of the wider population those taking part were.

Physical health and wellbeing

International review

Cachón-Zagalaz et al²¹ carried out a systematic review to find out how the quarantine measures had affected children's (under the age of 12 years) psychological and motor functioning. Three databases* were searched using the search terms "COVID-19" and "children" at the end of May 2020. Nine studies met the authors' inclusion criteria; eight commentaries, editorials or opinion pieces and one empirical study. The authors conclude that there are very few studies about how confinement/quarantine measures have affected younger children. However, this review is methodologically weak. The search strategy is limited and is likely to have missed relevant articles. There was no apparent quality assessment of included reports carried out and the synthesis is very limited.

Sweden

The International Study of Movement Behaviours in the Early Years (SUNRISE) aims to assess the physical activity, sedentary behaviour, and sleep in children aged 0–5 years.²² A feasibility study was carried out in Sweden in March to May 2019. Parents of children (aged 3-5 years) attending pre-schools were invited to take part. Assessments of fine and executive functions as well as physical measurements of height and weight were carried out. Physical activity and sleep was assessed by an accelerometer over three consecutive work days. Screen time was assessed by parental questionnaire. Parents who had taken part in the original study were contacted to ask them to take part in this current study. In a telephone interview, during May and June 2020, participants (n=82, 81.2% response rate) were asked 25 questions related to their child's physical activity, sedentary behaviour screen time and sleep during the COVID-19 restrictions.

In the original study, fourteen children (19.4%) were meeting all the components of the WHO guidelines for screen time, physical activity and sleep. During the pandemic, children's parent-reported physical activity, time spent outside and screen time significantly increased. However, there is reliance on parent-reported physical activity for the information during the pandemic rather than the more objective measures used pre-pandemic.

* Web of Science, Scopus, Dialnet

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- ⁹ Sherr L, Cluver L, Tomlinson M, Idele P, Banati P, Anthony D, et al. [Beyond Masks: Societal impacts of COVID-19 and accelerated solutions for children and adolescents.](#) Florence: UNICEF Office of Research – Innocenti; 2020.
- ¹⁰ Scottish Government. COVID-19: [Children, young people and families October 2020 Evidence Summary.](#) Edinburgh: Children and Families Analytical Unit, Scottish Government; 2020.
- ¹¹ Nearchou F, Flinn C, Niland R, Subramaniam SS, Hennessy E. Exploring the Impact of COVID-19 on Mental Health Outcomes in Children and Adolescents: A Systematic Review. *Int J Environ Res Public Health* 2020;17. [doi:10.3390/ijerph17228479.](#)
- ¹² Skripkauskaitė S, Pearcey S, Raw J, Shum A, Waite P, Creswell C. [Report 06: Changes in children and young people’s mental health symptoms from March to October 2020.](#) 2020.
- ¹³ Cusinato M, Iannattone S, Spoto A, Poli M, Moretti C, Gatta M, et al. Stress, Resilience, and Well-Being in Italian Children and Their Parents during the COVID-19 Pandemic. *Int J Environ Res Public Health* 2020;17. [doi: 10.3390/ijerph17228297.](#)
- ¹⁴ Giannopoulou I, Efstathiou V, Triantafyllou G, Korkoliakou P, Douzenis A. Adding stress to the stressed: Senior high school students’ mental health amidst the COVID-19 nationwide lockdown in Greece. *Psychiatry Res* 2020:113560. [doi:10.1016/j.psychres.2020.113560.](#)
- ¹⁵ Davidson B, Schmidt E, Mallar C, Mahmoud F, Rothenberg W, Hernandez J, et al. Risk and resilience of well-being in caregivers of young children in response to the COVID-19 pandemic. *Transl Behav Med* 2020. [doi:10.1093/tbm/ibaa124.](#)
- ¹⁶ Graber KM, Byrne EM, Goodacre EJ, Kirby N, Kulkarni K, O’Farrelly C, et al. A rapid review of the impact of quarantine and restricted environments on children’s play and the role of play in children’s health. *Child Care Health Dev* 2020. [doi:10.1111/cch.12832.](#)
- ¹⁷ OFSTED. [COVID-19 series: briefing on early years, October 2020.](#) Manchester: OFSTED; 2020.
- ¹⁸ Children’s Parliament. [How are you doing? A report on the findings from the How are you doing? survey.](#) Edinburgh: Children’s Parliament; 2020.
- ¹⁹ Marchant E, Todd C, James M, Crick T, Dwyer R, Brophy S. Primary school staff reflections on school closures due to COVID-19 and recommendations for the future: a national qualitative survey. *MedRxiv* 2020. [doi:10.1101/2020.11.06.20227108.](#)
- ²⁰ Champeaux H, Mangiavacchi L, Francesca M, Piccoli L. [Learning at Home: Distance Learning Solutions and Child Development during the COVID-19 Lockdown.](#) Bonn: IZA – Institute of Labor Economics; 2020.
- ²¹ Cachón-Zagalaz J, Sánchez-Zafra M, Sanabrias-Moreno D, González-Valero G, Lara-Sánchez AJ, Zagalaz-Sánchez ML. Systematic Review of the Literature About the Effects of the COVID-19 Pandemic on the Lives of School Children. *Front Psychol* 2020; 11:569348. [doi:10.3389/fpsyg.2020.569348.](#)
- ²² Delisle Nyström C, Alexandrou C, Henström M, Nilsson E, Okely AD, Wehbe El Masri S, et al. International Study of Movement Behaviors in the Early Years (SUNRISE): Results from SUNRISE Sweden’s Pilot and COVID-19 Study. *Int J Environ Res Public Health* 2020; 17. [doi: 10.3390/ijerph17228491.](#)

Parents’ perspectives

Two studies that explored the viewpoints of parents; the first looked at parents’ perceptions of COVID-19 symptoms and the ability to self-isolate and the second about their willingness to have their child vaccinated.

Symptoms of COVID-19

Hodson et al²³ explored parent's perceptions of COVID-19-like symptoms in their child and their attitudes towards self-isolation within their household. Thirty parents of children aged 4-18 years took part in semi-structured telephone interviews in April 2020. Respondents reported that they were likely to attribute symptoms to a non-COVID explanation, particularly if symptoms were transitory or mild. However, parents reported being more cautious if their child developed a temperature, whereas a cough could be put down to a sore throat or the common cold. Unexpected or unusual symptoms were reported to be a particular cause for concern. Some respondents said that they would treat any symptoms as potentially related to COVID-19.

There were mixed attitudes to their ability to isolate from others in the household, particularly if it involved avoiding contact with their children. Commonly, respondents suggested that if a household member had COVID-19 related symptoms, it was inevitable that the whole household would be infected. Parents reported that their ability to isolate would be affected by the availability of additional help or resources. The size of the family home was identified as an additional challenge.

There is, however, information missing from this report. There is no information given about how parents were recruited to take part and no socio-demographic details are given, so it is possible to tell how representative of the wider population those taking part were. In addition, it is unclear what proportion of respondents held the views expressed as all are quantified as 'some'.

Vaccination

Using a cross-sectional survey, Goldman et al²⁴ aimed to look at predictors associated with caregivers' intent to vaccinate their children against COVID-19. Caregivers who attended, with their children, sixteen paediatric emergency departments in six countries* were recruited through posters in waiting areas and direct approach by health care team members. Respondents completed the survey on their own smartphone. This paper reports responses (n=1541) to a question about whether they would give their child a COVID-19 vaccination.

Almost two-thirds (65.2%, n=1005) of those taking part, suggested they would have their child vaccinated for COVID-19 when it was possible, a third (33%, n=509) and 27 (1.8%) failed to answer the question. Factors which were found to predict caregiver willingness to vaccinate against COVID-19 were the child's age (older children), vaccinations being up-to-date, and child and caregiver vaccination against influenza in the past year and care-giver concern about the

* US, Canada, Israel, Japan, Spain and Switzerland

child having COVID-19. Factors which predicted lack of willingness to vaccinate were mothers completing the survey and the child having a chronic illness.

In this study, however, the recruitment process introduces a potential source of bias. There is limited demographic information given in this report so it is not possible to tell how representative of the wider population those taking part were. The numbers completing the survey in each country were relatively small; US n=317, Canada n=542, Switzerland n=438, Spain n=124, Israel n=91 and Japan n=29.

²³ Hodson A, Woodland L, Smith LE, Rubin GJ. Parental perceptions of COVID-19-like illness in their children. *MedRxiv* 2020. doi:[10.1101/2020.11.05.20226480](https://doi.org/10.1101/2020.11.05.20226480).

²⁴ Goldman RD, Yan TD, Seiler M, Parra Cotanda C, Brown JC, Klein EJ, et al. Caregiver willingness to vaccinate their children against COVID-19: Cross sectional survey. *Vaccine* 2020;38:7668–73. doi:[10.1016/j.vaccine.2020.09.084](https://doi.org/10.1016/j.vaccine.2020.09.084).

Inequality

In a rapid evidence review, Spencer et al²⁵ examined published evidence about the impact of pandemics and epidemics on inequities in routine childhood vaccination. A number of electronic databases were searched using a combination of terms related to the population (children aged 0-18 years), exposure (e.g. pandemic, SARS, H1N1) and immunisation/vaccination to find papers that reported social, regional or gender inequalities in reductions in routine childhood vaccination coverage. No studies were identified that met their inclusion criteria.

²⁵ Spencer N, Nathawad R, Arpin E, Johnson S. Pandemics, epidemics and inequities in routine childhood vaccination coverage: a rapid review. *Bmjpo* 2020;4:e000842. doi:[10.1136/bmjpo-2020-000842](https://doi.org/10.1136/bmjpo-2020-000842).

APPENDIX 1: Method*

Search terms

- #1. coronavirus or corona virus or ncov* or covid* or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19
- #2. Child* or adolescen* or teen* or young person or young people or pupil*
- #3. Early years or childcare or nurser* or preschool* or pre-school* or kindergarten* or daycare or day care or school* or educational establishment* or "place of education" or special educational needs or (education* AND setting*) or teacher
- #4. #2 OR #3
- #5. #1 AND #4

Sources[†]

- Medline
- Embase
- LitCovid
- MedRxiv
- Proquest Coronavirus Research Database
- Proquest databases (Public Health, ASSIA, Sociological Abstracts)
- Don't forget the Bubbles
- Covid-19 Evidence Reviews (VA Syntheses Program)
- WHO Global literature on coronavirus disease – now incorporating CDC Covid-19 Research Articles Database
- UNICEF website
- UNICEF Children & COVID-19 Research Library
- Oxford COVID-19 Evidence Service
- RCPCH COVID-19 Research Evidence Summaries
- Evidence Aid
- HIQA Ireland Evidence Summaries
- HIQA Ireland Database of Public Health Guidance on COVID-19
- Scottish Government publications
- PHE COVID-19 Literature Digest
- CDC Morbidity & Mortality Weekly Report
- Google Advanced Search

* With thanks to Seona Hamilton, Public Health Librarian, Public Health Scotland

† The sources were updated from 23rd October to reflect changes in the online databases.

Inclusion criteria

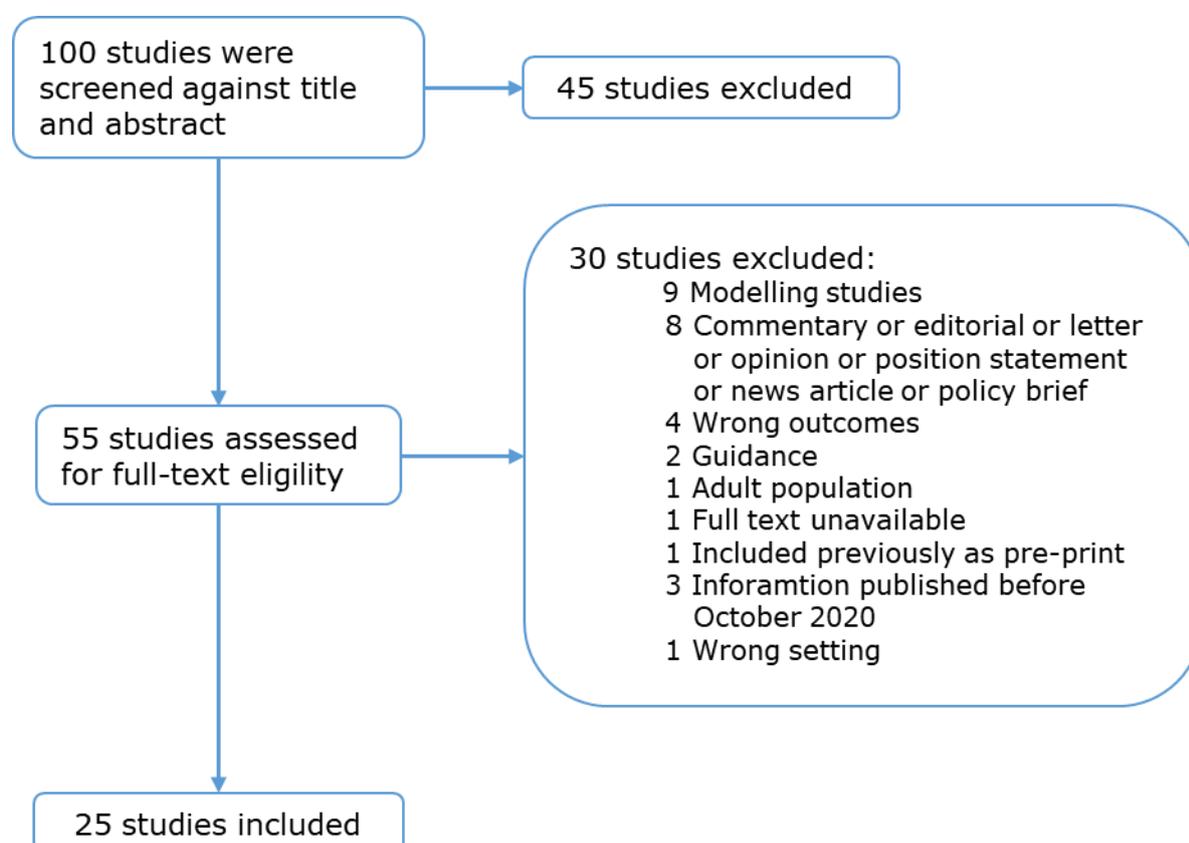
- Studies undertaken in Europe, North America, New Zealand or Australia
- Studies that report outcomes related to children and young people up to age 18 years living in community settings
- Studies that report transmission of COVID-19 in settings relevant to early learning and childcare, primary or secondary level schools
- Published in English
- Published or updated 6th-27th November

Exclusion criteria

- Studies relating to further or higher education settings
- Papers that report modelling studies
- Studies that examine the clinical manifestations, diagnosis or treatment of Covid-19 in a paediatric population
- Articles which are commentaries, editorials, position statements, letters, news articles or opinion pieces
- Guidelines for schools or 'hints and tips' for teachers
- Study protocols

Selection process

The titles and abstracts were screened for potential inclusion using the agreed inclusion/exclusion criteria. The full text of each potential paper was then assessed for inclusion. The progress of the papers through the selection process is summarised in the diagram below.



Appendix 2: Included studies

Transmission

CHARACTERISTIC	SUMMARY
Reference	Brotos P, Launes C, Buetas E, Fumado V, Henares D, de Sevilla MF, et al. Susceptibility to SARS-COV-2 Infection Among Children And Adults: A Seroprevalence Study of Family Households in the Barcelona Metropolitan Region, Spain. Clin Infect Dis 2020. doi:10.1093/cid/ciaa1721.
Aims	To assess seroprevalence of SARS-CoV-2 infection in children and adult contacts living with first-reported PCR-positive adult cases in quarantined family households and determine persistence of antibody response in cases.
Study design/setting	Cross-sectional seroprevalence study; April 28-June 3, 2020; Barcelona
Population	Families that included at least one first-reported adult case positive by SARS-CoV-2 PCR and at least one child aged less than 15 years living in the same household
Country	Spain
Method	<p>Recruitment: Families were recruited through an open web platform of a tertiary-level university children’s hospital in Barcelona. Researchers screened eligible families according to their demographic characteristics, their residence location, and the documented validity of the first-reported RT-PCR-positive result</p> <p>Method: A family household was defined as a household where at least one parent aged 18 years or older and one child under 15 years of age lived together. A COVID-19 first-reported adult case was defined as the parent in the household who had a first confirmed positive result for SARS-CoV-2 RNA detection in a nasopharyngeal swab. An infected contact was defined as a household child or adult, other than the first-reported case, who was found positive for SARS-CoV-2 by a rapid Immunochromatographic Lateral Flow Assay (LFA) detecting IgG, IgM, or both, in finger-prick obtained capillary blood at the household visit.</p>

	<p>Researchers interviewed every first-reported case by telephone 24 hours after sample collection. Interviews followed a structured questionnaire to obtain relevant epidemiological and clinical data of family members. Families with any invalid test result or that were not able to answer the questionnaire were excluded from the study.</p> <p>Analysis: The SARS-CoV-2 household seroprevalence rate was calculated as the proportion of family contacts who were confirmed to be infected by the rapid LFA. SARS-CoV-2 household seroprevalence and seropositivity rates were compared with the Chi-square test or the Fisher's exact test. Univariate logistic regression analyses were performed to study the associations of clinical and epidemiological variables with SARS-CoV-2 seroprevalence and antibody response, considering those variables that showed a relationship with these outcomes at a p value ≤ 0.10 for multivariate analysis. Statistical significance was set at a p-value of < 0.05 and confidence interval (CI) at 95%.</p>
Results	<p>1,359 families met inclusion criteria to take part. 410 families with a documented first RT-PCR-positive result for a household adult case, signed informed consents for participation, and were followed up by researchers. Complete information was received from 381 family households.</p> <p>1,465 family members were identified including 381 first reported adult cases, 672 children contacts (< 15 years) and 412 adult contacts (≥ 15 years). Among the 1,084 household contacts, 195 (18.1%) were found to be SARS-CoV-2-positive by rapid LFA, including 118 out of 672 (17.6%, 95% CI 14.8-20.7%) children and 77 out of 412 (18.7%, 95% CI 15.0-22.8%) adults. The difference in SARS-CoV-2 seroprevalence rates between children and adult contacts was not statistically significant ($p=0.64$). Except for one child, all children contacts (99.9%) were pauci-symptomatic or asymptomatic.</p> <p>The use of public instead of private transportation to go to school before home confinement came into force was strongly associated with children being seropositive (33.3 vs. 14.9%, $p<0.001$).</p>
Comments	<p>68.9% of primary cases were healthcare workers – probably a reflection of the testing regimes in place at the time. This report does not differentiate between children who had mild (subclinical) symptoms or were asymptomatic. The method of recruitment is a potential source of bias. There is no explanation given about why/how the eligible of the</p>

	families were selected. It is not known how representative those taking part were of the wider population.
CHARACTERISTIC	SUMMARY
Reference	D'angelo D, Sinopoli A, Napoletano A, Gianola S, Castellini G, Del Monaco A, et al. Strategies to exiting the COVID-19 lockdown for workplace and school: A scoping review. Saf Sci 2021;134:105067. doi:10.1016/j.ssci.2020.105067.
Aims	Research questions: Which lockdown exit strategies for workers and students during the COVID-19 pandemic or any other similar pandemic have been reported in the literature?
Study design	Scoping review
Search strategy	Databases: Medline, Embase, SciSearch supplemented by Google Scholar (to 25 th May 2020), and hand-search of reference lists of included studies and key journals. Manual searches of the literature, until 1 July 2020.
Inclusion criteria	<ul style="list-style-type: none"> • Published in English, Spanish, German and Italian • workers (working age population) or students of all ages facing an epidemic/ pandemic crisis • studies that measure or discuss strategies to exit lockdown during an epidemic/pandemic crisis, • quantitative studies of any study design (i.e., systematic review, randomised controlled trials, cohort, case-control, quasi-experimental, cross-sectional, or mathematical model), as well as editorials, letters, and commentaries
Exclusion criteria	<ul style="list-style-type: none"> • Studies were excluded if they dealt with an epidemic/ pandemic crisis in the presence of a vaccine or herd immunity • articles focusing on healthcare workers were excluded
Countries	School setting: China, US

Method	<p>Method: first stage of screening was the review of titles and abstracts against the inclusion/exclusion criteria by two blinded reviewers. Any discrepancies were discussed between the two reviewers until a consensus reached. Disagreements were discussed with third reviewer. Selected papers from the first screening were then assessed by full-text reviews. A quality assessment of the retrieved studies was performed.</p> <p>Analysis: descriptive measures (e.g., counts and frequencies) of the characteristics of the included literature. Literature findings were categorised by setting (workplace and school) and by study methodology (observational studies, mathematical models, editorials/commentaries, and reviews).</p>
Results	<p>43 articles met the inclusion criteria; 5 studies were from before 2020. 23 were modelling studies, 11 were editorials/commentaries, 7 observational studies and 2 narrative reviews. School settings were the focus in 2 observational studies and 1 narrative review, 10 mathematical models and 8 editorials/commentaries.</p> <p>School setting: one observational study published in 2014 from flu outbreak in US, one observational study from March 2020 in China and one expert consensus (labelled narrative review) bringing together lessons from Asia early on in the pandemic.</p> <p>The authors suggest that that results highlight a gap in the literature, as the study designs were predominantly mathematical models, editorials, and observational studies. In the main, lockdown exit strategies were based on general criteria that act like guiding principles. From the limited observational studies and narrative review in relation to schools the guiding principles include:</p> <ul style="list-style-type: none"> • low community prevalence of virus • use of non-medical face masks • social distancing • gradual return • testing and contact tracing • serological testing & quarantine
Comments	<p>Observational studies were not quality assessed – only modelling studies were. Included editorials and commentaries. Relevant results extracted in keeping with evidence scanning</p>

	report agreed inclusion criteria. The heterogeneous nature of the included studies are given equal weighting in the findings.
CHARACTERISTIC	SUMMARY
Reference	Desmet S, Ekinçi E, Wouters I, Decru B, Beuselinck K, Malhotra-Kumar S, et al. No SARS-CoV-2 carriage observed in children attending daycare centers during the first weeks of the epidemic in Belgium. J Med Virol 2020. doi:10.1002/jmv.26689.
Aims	To investigate the (asymptomatic) carriage of SARS-CoV-2 in children attending day care centres during the period 2-12 March 2020
Study design/setting	Cross-sectional.
Population	Children aged 6-30 months attending day care centres
Country	Belgium
Method	<p>This study was embedded in a nasopharyngeal carriage study that started in 2016 to monitor changes in the proportions of pneumococcal serotypes in children attending day care centres. Day care centres were selected at random.</p> <p>A single nasopharyngeal swab was collected from participating children. A questionnaire regarding the child's demographic and clinical characteristics, as well as pneumococcal vaccination status was filled in by their parents. Signs of common cold in children were defined as coughing and/or running nose, and were registered during sampling.</p> <p>Sample collection during 2019-2020 was performed from beginning November 2019 to the end of March 2020. Nasopharyngeal swabs taken during 2-12 March were analysed using the in-house SARS-CoV-2 real-time PCR for SARS-CoV-2.</p>
Results	Nasopharyngeal swabs taken from 84 children attending 8 different day care centres were analysed. 43 (52.4%) were girls, in half of the children (51.2%) signs of the common cold were observed at the time of sampling, just over half (56.1%) of the children had at least

	<p>one sibling in the same household and the majority of children (87.8%) stayed at least twice a week in day care.</p> <p>All analysed samples were negative for SARS-CoV-2.</p>
Comments	<p>There are no reliable Belgian incidence rates of SARS-CoV-2 available for March 2020. Sero-prevalence of SARS-CoV-2 IgG was 2.9% at the end of March.</p> <p>There is limited demographic information presented in this report eg no ages of the children taking part.</p>

CHARACTERISTIC	SUMMARY
Reference	<p>Hippich M, Holthaus L, Assfalg R, Zapardiel Gonzalo JM, Kapfelsperger H, Heigermoser M, et al. Public health antibody screening indicates a six-fold higher SARS-CoV-2 exposure rate than reported cases in children. Med (N Y) 2020. doi:10.1016/j.medj.2020.10.003.</p>
Aims	To develop and validate a 2-stage approach for immune surveillance of SARS-CoV-2
Study design/setting	Population-based screening of children using capillary blood from children participating in type 1 diabetes screen programme (n=15,771) and dried blood spots from neonates (n=1,916)
Population	Neonates and children aged 1-18 years living in Bavaria
Country	Germany
Method	Blood samples were tested for IgG antibodies to the virus' receptor-binding domain (RBD) using a luciferase immunoprecipitation system. Any samples that tested positive were tested for antibodies to a second anti-genic region, the nucleocapsid protein.
Results	Dual positivity for RBD and nucleocapsid antibodies was observed in 82 children, including 1 of 513 (0.19%) children sampled in January, 0 of 1,026 in February, 1 of 1,099 (0.09%) in March, 9 of 1,472 (0.61%) in April, 21 of 2,822 (0.74%) in May, 25 of 2,206 (1.13%) children in June, and 25 of 2,746 (0.91%) children in July (p < 0.001). In April to July, no

statistically significant difference in antibody frequency between children aged 0 to 6 years (66 of 7,821, 0.84%) and children aged 7 to 18 years (14 of 1,425, 0.98%; $p = 0.72$) was detected.

Questionnaires on previous SARS-CoV-2 virus positivity and symptoms were completed by parents for 4,859 children (median age 3.2 years, IQR 2.2-5.1 years) enrolled between April and mid-July. SARS-CoV-2 antibodies were observed in 46 (0.95%) of the 4,859 children. A previous virus-positive result was reported by parents for 12 (0.25%) children, COVID-19-like or flu-like symptoms were reported in 514 (10.6%) children, including 9 of 12 virus-positive children, and 88 (1.8%) children had a virus-positive family member. This included 11 of the 12 (91.7%) children reported as SARS-CoV-2 virus positive, 20 of 77 (26%) children without a virus-positive report but with a virus-positive family member, 4 of 474 (0.84%) children with symptoms but without a virus-positive report or virus-positive family member, and in 11 of 4,296 (0.3%) of the remaining children ($p < 0.0001$).

Of the 88 children who had at least 1 virus-positive family member, 30 (34.1%) were positive for SARS-CoV-2 antibodies, 11 (12.5%) were reported as virus-positive, and 31 (35.2%) were either antibody or virus positive. There was no difference in age between the 31 children who were antibody or virus positive (median, 4.1 years; IQR, 2.1-5.1) and the 57 who were negative (median, 3.9 years; IQR, 2.9-5.1; $p = 0.91$) and no difference in sex between the two groups (55% male versus 49% male; $p = 0.80$).

Of the 47 SARS-CoV-2 antibody-positive or virus-positive children with completed questionnaires, 22 (46.8%) did not report symptoms, and 11 (24%) were reported to have no symptoms and no family member with a positive COVID-19 test.

The cumulative incidence of authority-reported virus-positive cases in Bavarian children aged 0 to 18 years was around 2-fold lower at March (46 per 100,000), and around 6- to 8-fold lower at the end of April (111 per 100,000), May (129 per 100,000), June (136 per 100,000), and July (156 per 100,000). Unlike the SARS-CoV-2 antibodies, the incidence of authority reported virus-positive cases was lower in children aged 0 to 6 years (111 per 100,000 at the end of July) than in children aged 7 to 18 years (182 per 100,000; $p < 0.0001$) and both were lower than in adults (438 per 100,000; $p < 0.0001$).

The overall SARSCoV-2 antibody prevalence between April and July 2020 was found to be 0.87% in children and 0.47% in new-borns. The prevalence of the antibodies in children was substantially higher than the incidence of health authority-reported SARS-CoV-2

	cases. Almost half of the antibody-positive children did not show symptoms, and transmission rates in children with a virus-positive family member were 35%.
Comments	The majority of children taking part in this study were younger (0-6 years)
CHARACTERISTIC	SUMMARY
Reference	Ladhani SN, Andrews N, Aiano F, Baawuah F, Amin-Chowdhury Z, Brown KE, et al. Secondary attack rate and family clustering of SARS-CoV-2 infection in children of healthcare workers with confirmed COVID-19. Clin Infect Dis 2020. doi:10.1093/cid/ciaa1737.
Aims	To estimate the secondary attack rate using SARS-CoV-2 seropositivity to confirm virus exposure in a subset of children of healthcare workers with laboratory-confirmed COVID-19
Study design/setting	The RAPID-19 study recruited children of healthcare workers in five UK cities from May 2020. The study had multiple objectives, including monitoring SARS-CoV-2 infection, symptoms, illness severity, hospitalisation and seroprevalence over 4-6 months. This report focuses on the London cohort.
Population	Families with at least one parent who was healthcare worker
Country	England
Method	Recruitment: healthcare workers were invited by email Method: Nasal swab for RT-PCR assay and venous blood specimen taken for SARS-CoV-2 IgG. Analysis: Data described as medians with interquartile ranges (IQR) and compared using the Mann Whitney U test. Proportions were compared using Fisher's Exact test. Family clustering of cases was assessed using random effects logistic regression (with household as the random effect. The significance of the clustering parameter (rho) was tested using a likelihood ratio test.
Results	126 families with 215 children took part. Twenty-one families (21/126, 16.7%) reported at least one parent who had developed COVID-19 symptoms (fever or new-onset cough)

	<p>and tested positive for SARS-CoV-2 RNA by RT-PCR at the time of infection (n=19) or by serology (n=2) a few weeks later.</p> <p>At least one child had SARS-CoV-2 IgG in 9/21 (42.9%, 95%CI 21.8-66.0%) of the families with a positive parent and 20 (45.5%) of 44 children tested positive for SARS-CoV-2 IgG.</p> <p>There was evidence of strong family clustering, such that the SAR was 95.2% in 9 families with at least one seropositive child compared to none of the 23 children in 12 other families.</p> <p>There were no significant differences in family size, ethnicity, source of infection (index case), degree of self-isolation by the index case between families with and without seropositive children.</p> <p>The children in the seropositive families were more likely to be older and male and have a history of a COVID-19 like illness during the period between their parent's illness and the antibody test.</p>
Comments	<p>Recruited during first wave when schools were closed and social restrictions in place. Not sure when this study was carried out – only states that recruitment was in May. Not known what community prevalence at time was or where healthcare staff taking part were working. Relatively small numbers took part.</p>

CHARACTERISTIC	SUMMARY
Reference	<p>Larosa E, Djuric O, Cassinadri M, Cilloni S, Bisaccia E, Vicentini M, et al. Secondary transmission of COVID-19 in preschool and school settings after their reopening in northern Italy: a population-based study. MedRxiv 2020. doi:10.1101/2020.11.17.20229583.</p>
Aims	<p>To describe secondary transmission of SARS-CoV-2 among students and teachers/personnel after the reopening of preschools and schools in Reggio Emilia, Italy.</p>
Study design/setting	<p>Prospective population-based study; educational settings, September 1 – October 15, 2020. Second wave began in region in October.</p>

	<p>At the time of the study schools had adopted the following mitigations:</p> <ul style="list-style-type: none"> i) mandatory wearing of surgical masks at all times (not in primary schools) except when students are seated at their desk and are not speaking ii) only single desks are used (rather than the traditional double desks) iii) desks must be at least one meter apart iv) when the classrooms are not big enough to respect social distancing, students are divided into two groups, which alternate attending school and remote learning <p>The epidemiological investigation includes an assessment of the nature of the contact between the index case and his/her classmates, which determines isolation measures: a) all students are isolated if the physical classroom itself makes maintaining distance impossible and/or masks are not worn constantly and/or if secondary cases are ascertained; or b) only those in close contact or who have contact outside of school are isolated, provided that social distancing with the other students has been respected. If classmates are not isolated and didactic activities continue at school (rather than remote), mask wearing is mandatory all the time once a case has been identified.</p>
Population	Children and staff in educational settings
Country	Italy
Method	When a positive case either attends or teaches/personnel at a school, everyone in the class is immediately tested. If the swab is performed earlier than six days from the last contact with the index case, a second swab is also collected at 10/14 days.
Results	During the study period, there were 43 index cases; 38 pupils and 5 teachers. 41 classes in 36 different schools were notified: eight infant-toddler centres and preschools, 10 primary and 18 secondary schools. In all cases, only single classes were considered, except in a preschool, where a larger group sharing common spaces was tested, and in a secondary school, where two classes that did curricular activities together were tested. 994 students and 204 teachers were tested during the epidemiological investigations. 39 secondary cases (3.9%) were identified among 994 children tested, in a total of 13 classes: in one primary school, in five middle schools and in three high schools. The attack rate was higher in secondary schools (6.64%) than in primary schools (0.44%), while

	there were no secondary cases in the preschool settings. There were no secondary cases among tested teachers and staff members.
Comments	The majority of the study was carried out in September before the second wave was evident in the region. In October the cumulative incidence was 1.8%

CHARACTERISTIC	SUMMARY
Reference	Suk JE, Vardavas C, Nikitara K, Phalkey R, Leonardi-Bee J, Pharris A, et al. The role of children in the transmission chain of SARS-CoV-2: a systematic review and update of current evidence. MedRxiv 2020. doi:10.1101/2020.11.06.20227264.
Aims	To assess child-to-child and 19 child-to-adult SARS-CoV-2 transmission and to characterise the potential role of school closures on community transmission.
Study design	Systematic review
Search strategy	Medline and Embase searched using subject heading terms and free text related to population (1-17 years), concept (child-to-child and child-to-adult transmission) and context (community, household and school transmission). In addition, the reference lists of the included articles were screened to identify further relevant studies.
Inclusion criteria	<ul style="list-style-type: none"> • Published between December 2019 and 31st August 2020 • Published in English • Quantitative peer-reviewed research
Exclusion criteria	<ul style="list-style-type: none"> • neonatal transmission (<1 year) • opinion pieces, commentaries, editorials
Countries	Switzerland, US, Israel, Greece, South Korea, Ireland, France, Singapore, Australia Modelling studies: Singapore, US, China, South Korea, Canada

Method	<p>Two reviewers screened 100 identical articles independently in a pilot screening process, Inter-rater agreement was high (percentage agreement >90% and/ or Cohen's Kappa >0.81). Thereafter, the remaining titles were randomly allocated to the two reviewers and screened for eligibility independently by them. The retrieved articles were then independently double-screened by two reviewers based on the full text of the articles. Data was extracted independently by two reviewers, and the results were double checked across the original manuscript by a third reviewer. A narrative synthesis approach was taken. Mathematical modelling and simulation studies were assessed separately from those reporting real-life data.</p>
Results	<p>22 studies met the inclusions criteria: 14 reported on child-to-adult transmission of SARS-CoV-2 and 8 explored the impact of school closures on the epidemiology of the COVID-19 pandemic. 7/8 that assessed the impact of school closure were simulation models, while all 14 studies that assessed child-to-adult transmission patterns were observational studies.</p> <p>One case study and one ecological study assessed child-to-adult transmission of COVID1-19 within a community setting. Four studies assessed household child-to-child and child-to-adult transmission within family clusters. Six studies assessed SARS-CoV-2 transmission in a school setting^{****}. Two studies reported on the regional evidence after the re-opening of schools. Eight published studies were identified with regard to the effect of school closure on the epidemiology of the COVID-19 pandemic. Seven of these studies were based on mathematical modelling and various assumptions of infectivity from the first 3-4 months of the pandemic, while one was a time series study.</p> <p>The available evidence suggests that children can both be infected by and transmit SARS-CoV-2 in both community, household and school settings. Transmission of SARS-COV-2 was found to be higher in household settings than in other community settings. There was limited cases in the assessed studies in which a child index case was responsible for secondary transmission in schools, apart from an outbreak in Israel, which was associated with dense spacing, lack of the use of facemasks and closed spaces with poor ventilation.</p> <p>Some evidence of differing transmission dynamics between younger vs. older children. In particular, when younger children were identified as the index case, there was a lower secondary attack rate compared to older children and adults.</p>

^{****} In Ireland, France, Singapore, Australia, Israel and US

Comments	The included studies were carried out in the early part of the pandemic when overall community prevalence was low. Numbers of cases in individual studies was relatively low. The studies related to school transmission have been included in systematic reviews already reported.
CHARACTERISTIC	SUMMARY^{§§§§}
Reference	von Bismarck-Osten C, Borusyak K, Schönberg U. The Role of Schools in Transmission of the SARS-CoV-2 Virus: Quasi-Experimental Evidence from Germany. London: Centre for Research and Analysis of Migration, University College London; 2020.
Aims	To assess effect of school closure on: <ul style="list-style-type: none"> • Infection rate in children • Infection rate in adults (“spill-over effect”) • Death rate in older adults (“spill-over effect”) To compare the effect of school closure in a time with low infection rate (summer holiday) with a time with high infection rate (autumn holiday).
Study design/setting	Quasi-experiment; analysis of routinely collected data Schools (children 5-14 years) in Germany operated at partial capacity up to the summer holiday, and all schools operated at full capacity but with additional hygiene- and mitigation measures in place after the summer holiday. The federal states in Germany have staggered summer- and autumn holidays <ul style="list-style-type: none"> • Time for each state’s holiday was pre-defined long before COVID-19, ie infection rate has not confounded the timing of the holiday. • Summer holiday lasted 6 weeks, and start date varied between states from June 20th to July 30th.

^{§§§§} With thanks to Tonje Laird, Health Protection, who reviewed this paper

	<ul style="list-style-type: none"> Autumn holiday lasted for 2 weeks in 12 states and for 1 week in 4 states, and start date varied from October 3 to October 31. <p>The start and end of the summer holiday did not coincide with other COVID-19 related restrictions being put in place (for example closure of bars, restaurants or shops), ie infection rate has not been confounded by such other measures.</p>
Population	General
Country	Germany
Method	<p>Empirical analysis, difference-in-differences estimation with staggered adoption of treatment (school closure and reopening in the summer, and school closure in the autumn)</p> <p>Take advantage of the variation in the start and end dates of school summer- and autumn holidays in the different states of Germany to isolate the impact of school closures and reopenings from other factors on the spread of COVID-19.</p> <p>By assessing the effects of both the summer- and autumn holidays, the study attempts to assess whether school closure was more or less effective at times when the infection rate was low within the population (which it was around the time for the summer holiday) compared to times when the infection rate was high within the population (which it was around the time for the fall holiday).</p>
Results	<p>Interpretation of main findings:</p> <p>Summer holiday start – school closure</p> <ul style="list-style-type: none"> For the first three weeks of the summer holiday, school closure had, at best, prevented 0.33 infections per 100,000 per day in <u>children</u> (5-14 years). For information, the average case rate in children was 0.680 per day per 100,000 in the week before the start of the summer holiday. For the first three weeks of the summer holiday, school closure had, at best, prevented 0.025 infections per 100,000 per day in <u>adults aged 60+</u>. For information, the average case rate in adults aged 60+ was 0.232 per day per 100,000 in the week before the start of the summer holiday.

- For the first three weeks after school closure, at most, 0.017 deaths per 100,000 adults aged 60+ were prevented.

Summer holiday finish – schools reopening

- Infection rates tended to increase in the last weeks of the summer holiday and declined in the first days after schools reopened. This was considered to be explained by an increase of testing of people returning from holidays in countries with higher infection rates.
- For the second and third week after school reopening, at most, 0.800 infections per 100,000 children (5-14 years) could have been prevented had schools remained closed.
- For information, the average case rate in children was 2.222 per day per 100,000 in the week before schools reopened.
- For the second and third week after school reopening, at most, 0.107 infections per 100,000 adults aged 60+ could have been prevented had schools remained closed. For information, the average case rate in adults aged 60+ was 0.447 per day per 100,000 in the week before schools reopened.
- For the first three weeks after schools reopening, at most, 0.014 deaths per 100,000 adults aged 60+ could have been prevented had schools remained closed.

Autumn holiday

- For the two weeks of the autumn holiday, school closure had, at best, prevented 1.78 infections per 100,000 per day in children (5-14 years).
- For information, the average case rate in children was 4.08 per day per 100,000 during the week before the autumn holiday.
- For the two weeks of the autumn holiday, school closure had, at best, prevented 1.01 infections per 100,000 per day in adults aged 60+.
- For information, the average case rate in adults aged 60+ was 3.13 per day per 100,000 during the week before the autumn holiday.

Comments	<p>Age groups for which data was available: 0- 4 years, 5-14 years, 15-35 years, 35-59 years, 60-79 years and 80+ years. This means analysis does not take into account older age group of school pupils.</p> <p>This study applies complex modern econometric tools and a methodology (“imputation estimators”), not easy to understand and not supported by a robust evidence of reliability.</p> <p>The conclusions do rely on the German system and how in the weeks leading up to the summer holiday, the schools only operated at half capacity. Further, the infection rate over the summer was low. Thus, it may not be expected that school closures helped reduce the infection rate further.</p> <p>The effect of school closure during the autumn holiday was less precisely estimated due to their short length and the more limited variation in timing across states, and could only be assessed for two weeks. Therefore, this has probably not allowed the study to capture “spillover effects” to adults.</p> <p>Not clear indication of peer-review for this paper, published in online Economic Papers (https://econpapers.repec.org) invites to caution.</p>
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Health and wellbeing

CHARACTERISTIC	SUMMARY
Reference	<p>Cachón-Zagalaz J, Sánchez-Zafra M, Sanabrias-Moreno D, González-Valero G, Lara-Sánchez AJ, Zagalaz-Sánchez ML. Systematic Review of the Literature About the Effects of the COVID-19 Pandemic on the Lives of School Children. Front Psychol 2020;11:569348. doi:10.3389/fpsyg.2020.569348.</p>
Aims	<p>Research question: what do the studies already published determine about how confinement has affected children under the age of 12 on a psychological and motor level?</p>
Study design	<p>Systematic review; end May 2020</p>
Search strategy	<p>Databases: Web of Science (WOS), Scopus, and Dialnet databases</p> <p>Search terms: “COVID-19” and “children”</p>

Inclusion criteria	<ul style="list-style-type: none"> • Children up to 12 years • psychological and motor characteristics of children during confinement • papers relating COVID-19 to children • published in 2020 • journal articles • Published in English or Spanish • “Psychology”, “Sociology” or “Education Educational Research” areas of research
Exclusion criteria	Not stated
Countries	US, UK, Turkey, China (n=3), Italy, Spain (n=2)
Method	Screened at title and abstract for match with inclusion criteria, then full text. Coded by four authors
Results	Nine studies met the author’s inclusion criteria. Only one primary study reported empirical results – the remainder were commentaries, editorials or opinion pieces. The authors’ concluded that there were very few studies on how confinement has affected children under 12 years old psychologically and motorly. They suggest that the articles included in the review agree on the consequences that confinement can have on minors and on the importance of psychological support from the family, and the establishment of routines can be effective.
Comments	Methodologically weak. No apparent quality appraisal. Search strategy very selective and therefore likely to miss relevant articles. No clear about how many involved in screening of articles. Very limited synthesis.

CHARACTERISTIC	SUMMARY
Reference	Champeaux H, Mangiavacchi L, Francesca M, Piccoli L. Learning at Home: Distance Learning Solutions and Child Development during the COVID-19 Lockdown. Bonn: IZA – Institute of Labor Economics; 2020.
Aims	To understand how the COVID-19 lockdown has affected the use of time, the learning process and the emotional status of pupils aged 3 to 16 years in France and Italy
Study design/setting	Cross-sectional survey; Italy 7 th April – 10 th May, France 21 st April – 10 th May. In Italy, all schools closed on 4 th March and in France 16 th March. By 17 th March 17 both countries had implemented home confinement measures and by 23 rd March there were travel limitations imposed. Restrictions began to be lifted on 11 th May in both countries. In France schools gradually opened from 11 th May with full return on 22 nd June. In Italy schools fully re-opened, in the main on 14 th September.
Population	Families with children aged 3-16 years
Country	Italy and France
Method	<p>Recruitment: not clearly stated</p> <p>Method: The survey asked basic information on respondents' and partners' personal characteristics including gender, age, and location of residence, highest level of education, marital status, and parental status. It also collected detailed information on respondents' and partners' labour market participation and on the division of household tasks before and during the outbreak.</p> <p>Questions about the parental time use in terms of number of hours spent on active childcare and home-schooling were included. In addition, parent's subjective opinions on the child's educational improvement during lockdown as well as emotional status and relationship between parents and children were collected. Questions on children's time use before and after the closure of the schools. In particular, information about hours spent in studying, performing extracurricular activities, reading and watching tv (and other passive screens) as well as data about distance learning methods proposed to each child and about the availability of IT equipment as computers, pads, smartphones</p>

	Analysis: not clearly stated; Multivariate logistic regression
Results	<p>3,352 families with children (n=4,477 children) in Italy and 2,154 (n=3,272 children) in France took part.</p> <p>Lockdown had a stronger negative effect on boys, on kids attending kindergarten (in Italy) or secondary school (in France), and on children whose parents have a lower education level. Increases in the time spent in front of screen was correlated with a worse learning achievement and emotional status, while the opposite was true for the time spent reading.</p> <p>During lockdown, a strong reduction in extra school time was reported. The reduction in the time spent in extra school activities is compensated by an increase in reading time in France. In Italy this compensation was observed only for pre-school children.</p> <p>Time spent watching TV or on the internet (videos, socials) doubled in both countries, increasing from 1 to 2 hours on average for French kids and from 1.5 hours to 3 hours on average for the Italian ones.</p> <p>Substantial differences between the two countries and across school levels in remote learning activities. In both countries, almost all secondary school children have received contents and assignments by e-mail or through a platform, but while in Italy almost all of them attended online classes as well, the percentage of online lectures for France was 70%. In primary school, almost all the children received contents by email or platform, while on-line classes were offered to 65% of Italian students and to 20% of French ones. For kindergarten, almost 42.1 per cent of Italian kids were not involved in any activity, while only 3.6 per cent of French kids were in the same situation.</p> <p>In general parents reported on one hand an overall reduction in children's emotional status, on the other hand a slight increase in the quality of the parent-child relationship. Parents in both countries are slightly more worried for younger children (those in kindergarten and primary school) compared to those in secondary school. Italian parents appear, again, more worried for their kids' emotional status when compared to French parents.</p> <p>The increase in screen time is significantly associated to parental reported worse educational progress, while the increase in the time spent reading improved parents' evaluation. Parents' work status does not significantly affect children's learning process. A similar pattern is observed when analysing children's emotional status: the impact is</p>

	<p>clearly negative in both countries, but it is almost twice as large in Italy. Lockdown appeared to be more detrimental on learning achievement for boys than for girls in both countries. Notable differences across school levels emerge. In Italy pre-schoolers seem to have particularly suffered in terms of learning achievement with respect to the older kids, and, more in general, Italian parents give better evaluations to the learning progresses of their older kids. For France, we do not observe the same dynamics. Parents seems quite satisfied about the learning progresses of their primary school kids, while they give worse evaluations for children in kindergarten and in secondary school.</p> <p>When looking at the impact of lockdown on emotional status, boys seem to suffer more than girls, according to their parents, but only in Italy. Parents reported a worse emotional status for younger children. University educated parents are less worried about their kids' emotional status. Children with siblings appear to have suffered less from an emotional point of view in Italy, but not in France. Kids living with single parents were reported to have a larger decrease in their emotional status in both countries</p>
Comments	Parent recall/perspectives; non standardised questionnaire; missing data tables

CHARACTERISTIC	SUMMARY
Reference	Children's Parliament. How are you doing? A report on the findings from the How are you doing? survey. Edinburgh: Children's Parliament; 2020.
Aims	To find out the impact of school closures on children, on their experience of learning at home and now on the experience of learning after re-opening and with Coronavirus mitigation measures in place.
Study design/setting	Repeat cross-sectional in April, May, June and September/early October
Population	Children aged 8-14 years
Country	Scotland
Method	Recruitment: Not stated

	<p>Measures: 31 statements with a 5-point scale to respond – from strongly agree to strongly disagree. Plus final questions where children can identify what they are worried about and what helps them feel good.</p> <p>Analysis: This report compares results from the period of lockdown - combining April (4000 responses), May (3698 responses) and June (2810 responses) data to give us one data point - to new results from a fourth and final survey conducted in September/early October (1969 responses).</p>
Results	<p>Both during lockdown when they were learning at home, and now they are back at school – a minority agreed that they have a choice in what they learn. Post lockdown and back at school, regardless of sex or age, children reported they were less likely to feel safe online.</p> <p>After returning to school, fewer children reported that they enjoyed learning new things and fewer that if they wanted to they could be creative. Further, fewer children reported that they knew there are things that they are good at. Post lockdown younger children are more likely to report they are proud of things they can do while there was a decline for children aged 12 to 14.</p> <p>Post-lockdown children reported they had more fun things to do in their day, they felt less bored and they were more likely to say that when they do something, they try their hardest.</p> <p>During lockdown and post lockdown, nearly 1 in 3 children reported that their parents or carers worry about having enough money for their family. In the post lockdown period, younger children reported this concern in increased numbers.</p> <p>The vast majority of children enjoyed being with their family and reported that their family gets along well together. Children reported positively about their friends and responses indicate a strengthening of peer relationships after returning to school.</p> <p>There were statistically significant increases in the numbers of children who strongly agreed or agreed that there were lots of things they worry about in their life. Girls aged 12 to 14 who reported the highest levels of agreement. Worries about their own health and about the health of a family member increased post-lockdown. Slightly more than half of children reported worries about the future. Worries about doing school work were consistent when comparing lockdown to the return to school; 2 in 5 children remain worried. Although the children responding to the survey do not imminently face exams,</p>

	<p>worry about them increased significantly since the return to school. Post lockdown, children were more likely to report that they worry about money problems. Younger children aged 8 to 11 were more likely post-lockdown, to report worrying about multiple areas. However, children were less likely to report that they are worried about how their friends or family are doing. Post-lockdown, children pointed to friends as the most likely thing to help them to feel better. While the vast majority of children reported having someone to talk to, 4% of children in lockdown, and 6% of children post-lockdown, indicated that they did not.</p> <p>Children were more likely to strongly agree/agree with the statement 'Generally, I feel cheerful and I am in a good mood' post-lockdown. There was an increase in positive responses to the statement 'Most of the time I have plenty of energy' from 12 to 14 year olds, both boys and girls, is statistically significant (Boys +11%/Girls+8%). For the younger children aged 8 to 11, both girls and boys, there is a statistically significant decrease in the percentages who strongly agreed/agreed.</p> <p>For all children there was a reduction in the numbers of children who strongly agreed/agreed with the statement 'I often feel lonely' from 26% to 20%, and for older girls a statistically significant fall from 34% to 20% who strongly agreed/agreed.</p> <p>There was a statistically significant decline in the percentage of 12-14 year old girls who strongly agreed/agreed with the statement 'Even if I am having a difficult time, I feel I will be okay' from 62% to 54%. For younger children there are also statistically significant falls: boys 76% to 65% and for girls 72% to 58% who strongly agree/agree.</p>
Comments	<p>No socio-demographic information is reported so it is not possible to tell if those taking part are representative of the wider population or if the cohort who completed the survey post-lockdown/return to school had similar characteristics to those that had completed the survey previously. No data tables.</p>

CHARACTERISTIC	SUMMARY
Reference	<p>Cusinato M, Iannattone S, Spoto A, Poli M, Moretti C, Gatta M, et al. Stress, Resilience, and Well-Being in Italian Children and Their Parents during the COVID-19 Pandemic. Int J Environ Res Public Health 2020;17. doi:10.3390/ijerph17228297.</p>

Aims	To investigate parents' and children's well-being, parental stress, and children's resilience during the COVID-19 pandemic.
Study design/setting	Cross-sectional survey; 25 th April 2020 – 8 th May 2020
Population	Parents with children aged 5-17 years living at home
Country	Italy
Method	<p>Recruitment: not stated</p> <p>Measures: Psychological General Well Being Index (PGWB) to assess parental well-being, the Strengths and Difficulties Questionnaire (SDQ) to measure children's well-being, the Parent Stress Scale (PSS) to investigate parental stress, and the Child and Youth Resilience Measure (CYRM-R) to measure children's resilience.</p> <p>Analysis:</p> <ul style="list-style-type: none"> • descriptive statistics and frequency tables • independent sample t-tests • general linear models (GLM) • multiple linear regression • analysis of variance (ANOVA) • Correlation tests using Pearson's r coefficient to explore the relationships between children's resilience, their behavior, and parents' stress and psychological condition
Results	<p>463 parents took part. This study found no statistical difference between the SDQ total scores of older (13-17 years) and younger age groups (5-12 years). There were no statistically significant difference between the mean scores of the Italian normative sample of the SDQ as test values, and the scores of children (aged 6-10 years) in this study. Gender only significant affected the prosocial behaviour scale with females obtaining higher scores than males. Negative correlations between the CYRM-R total score with all SDQ scales (values ranging from $r = -0.40$ to $r = -0.63$), except for the prosocial behaviour scale ($r = 0.43$).</p>

	<p>There was no statistically significant difference in PSS total score in parents of older and younger children. PSS was found to be linked with family structure and presence of children with psychological, physical or genetic disorders. With respect to family structure, the post hoc test with Bonferroni correction showed a significant difference between the nuclear family structure and the single-parent structure, with the members of the latter obtaining higher average scores. Moreover, participants who changed their working routine showed higher levels of stress compared to those whose working conditions remained unchanged. Participants living with children affected by physical or psychological problems also obtained higher PSS scores compared to the parents of healthy children. In addition, parental stress levels increased as a function of the number of children living at home.</p> <p>Mothers reported lower levels of well-being and perceived self-control and higher levels of anxiety compared to the means of the Italian normative sample of the PGWB as test values. Total PGWB score significantly affected by the presence of modifications in parents' working conditions, the child's age, and the presence of parents suffering from psychological, physical or genetic problems. In particular, parents who suffered/had suffered from medical or psychological conditions obtained lower scores compared to those who did/had not, reflecting lower levels of well-being. Participants who changed their working routine showed lower PGWB total scores compared to those whose working condition was unchanged. Lastly, both PGWB scores and parental well-being increased as a function of the child's age.</p>
Comments	Data tables not all included. Difficult to tell representativeness of wider population.

CHARACTERISTIC	SUMMARY
Reference	Davidson B, Schmidt E, Mallar C, Mahmoud F, Rothenberg W, Hernandez J, et al. Risk and resilience of well-being in caregivers of young children in response to the COVID-19 pandemic. Transl Behav Med 2020. doi:10.1093/tbm/ibaa124.
Aims	To evaluate the effects of the COVID-19 pandemic on family functioning and mental health in a racially, ethnically, and linguistically diverse sample of caregivers of young children

Study design/setting	Cross-sectional; survey questionnaire; 22 nd April to 22 nd May 2020, during a stay-at-home order
Population	Caregivers of children 0-5 years
Country	USA
Method	<p>Recruitment: caregivers ($\approx 2,000$) taking part in 6 service programmes were emailed link to survey questionnaire. In addition, caregivers were recruited through a community partnership with a neighbourhood centre serving Haitian families</p> <p>Measures: "Risk and Resilience survey" including</p> <ul style="list-style-type: none"> • Everyday Stressors Index to evaluate caregivers' level of concern regarding their health, the health of family members, employment, housing, transportation, having enough money for basic necessities, and relationships. Two items added to assess concerns related to childcare and schooling from home • caregiver mental health symptoms using selected items from the Experiences Related to COVID-19 Questionnaire • 10-item (yes or no) scale to assess whether caregivers were engaging in a number of activities in an attempt to cope with pandemic-related stress. The number of coping strategies was summed to create a total score, with higher scores indicating greater adaptive coping • caregivers' sense of self-efficacy to deal with pandemic-related stressors - eight items were based on the World Health Organization COVID-19 Healthy Parenting Guidelines plus one U.S. Household Food Security Survey item assessed confidence in accessing well-balanced meals. • Child psychosocial concerns were assessed using the Strengths and Difficulties Questionnaire (SDQ) • Caregivers indicated their needs and preferences for one or more tiers of remote/online services, ranging from least to most supportive and intensive <p>Survey was available in English, Spanish and Creole</p>

	<p>Analysis: Participant demographic variables were explored using descriptive statistics. Path analysis.</p> <p>There were eight hypothesized paths with three regression analyses: Caregiver COVID-related Stress and Child Psychosocial Concerns were hypothesized to predict COVID-related Caregiver Self-Efficacy; Caregiver COVID-related Stress and Child Psychosocial Concerns were also hypothesized to predict Caregiver Coping Strategies; Caregiver COVID-related Stress, Child Psychosocial Concerns, COVID-related Caregiver Self-Efficacy, and Caregiver Coping Strategies were hypothesized to predict caregiver mental health symptoms. To determine the strength of the path between two variables, standardised (β) path coefficients and standard errors (SEs) were calculated.</p>
Results	<p>260 (13% response rate) completed the online survey and 26 completed in person.</p> <p>When asked about significant changes in mental health functioning (Caregiver Mental Health Symptoms) since the outbreak of the pandemic, 72% reported increased anxiety, 46% reported increased sadness/depression, 39% reported sleep disruptions, and 34% reported increased anger.</p> <p>When asked about managing family needs, 38% of caregivers reported problems with child behaviour, and 42% had significant concerns regarding their child's/children's schooling from home. Fifty-six percent reported concerns about having too many responsibilities. Twenty-nine percent were concerned about their child's/children's health, and 31% were concerned about another family member's health due to the pandemic.</p> <p>Caregiver COVID-related stress had a statistically significant positive association with caregiver mental health symptoms. Caregiver COVID-related stress also exhibited a statistically significant negative association with COVID-related caregiver self-efficacy. Then, COVID-related caregiver self-efficacy had a statistically significant negative path on caregiver mental health symptoms. These three significant paths demonstrated that caregiver COVID-related stress had both direct and indirect effects on caregiver mental health symptoms, and this mediation was significant.</p> <p>Greater caregiver COVID-related stress was associated with less COVID-related caregiver self-efficacy, which was associated with more deleterious caregiver mental health symptoms. Additionally, child psychosocial concerns were significantly correlated with</p>

	caregiver COVID-related stress. Further, when controlling for this correlation, child psychosocial concerns were significantly associated with caregiver mental health symptoms. Child psychosocial concerns were not significantly associated with caregiver self-efficacy. Additionally, child psychosocial concerns were significantly negatively associated with caregiver coping strategies, though caregiver coping strategies were not significantly associated with caregiver mental health symptoms or COVID-related stress. Thus, overall, child psychosocial concerns had only a direct effect on caregiver mental health symptoms, with no mediation present.
Comments	Limited data tables. Low response rate. Early in the pandemic

CHARACTERISTIC	SUMMARY
Reference	Delisle Nyström C, Alexandrou C, Henström M, Nilsson E, Okely AD, Wehbe El Masri S, et al. International Study of Movement Behaviors in the Early Years (SUNRISE): Results from SUNRISE Sweden’s Pilot and COVID-19 Study. Int J Environ Res Public Health 2020; 17. doi:10.3390/ijerph17228491.
Aims	To: (i) assess the proportion of Swedish preschool-aged children meeting the WHO Global guidelines for the early years, (ii) evaluate the feasibility of the methods for the SUNRISE study in the Swedish context, and (iii) assess how movement behaviors have been affected in Swedish preschool children during the COVID-19 pandemic.
Study design/setting	Longitudinal. Original data collection for the SUNRISE Sweden pilot study March-May 2019, COVID-19 questionnaire administered in telephone interview in May-June 2020.
Population	Children aged 3-5 years with parents who could sufficient Swedish to give informed consent and answer the questionnaire
Country	Sweden
Method	Recruitment: For the SUNRISE pilot study, 13 pre-schools were approached and 12 agreed to take part. Parents of eligible children were then contacted. Participating parents were contacted by text message to ask them to take part in this current study.

	<p>Measures: In the SUNRISE study, parents were asked basic demographic information on the child and parent as well as questions regarding the child’s movement behaviour. Research staff visited the preschools to measure height and weight, gross and fine motor skills, as well as executive functions. The ActiGraph wGT3x-BT tri-axial accelerometer was fitted and worn for three consecutive weekdays over the right hip to assess the children’s physical activity and sleep for two consecutive 24 h periods.</p> <p>Screen time was assessed in the parental questionnaire. Executive functions (i.e., cognitive flexibility, inhibition, and visual-spatial working memory) were assessed using three validated games for the iPad. The Ages and Stages Questionnaire was used to assess the children’s gross and fine motor skills.</p> <p>The COVID-19 questionnaire consisted of 25 questions relating to the children’s physical activity, sedentary behaviour, screen time, and sleep during the period of the COVID-19 restrictions in Sweden (i.e., May–June 2020). The questions regarding time spent in various movement behaviours were identical to the previous questionnaire. Parents who agreed to take part were phoned by a member of the research team.</p> <p>Analysis: descriptive statistics, where children were scored as either meeting or not meeting the guidelines separately and in combination. Differences between sexes were investigated using Wilcoxon’s rank-sum test and chi-squared test.</p>
Results	<p>82 (from original 101) parents agreed to take part.</p> <p>In the original study, fourteen children (19.4%) met the components of the WHO guidelines. Screen time, physical activity, and sleep guidelines were met by 37.8% (n=37), 90.3% (n=65), and 62.5% (n=45) of the children, respectively. No statistically significant differences between boys and girls were found for those meeting or not meeting the guidelines individually and in combination.</p> <p>During the COVID-19 pandemic the majority of Swedish parents reported that they were not concerned regarding their child’s physical activity (n=77, 93.9%) and screen time (n=73, 89.0%), as well as they felt they could support their child to have healthy movement behaviours (n=80, 97.6%). During the COVID-19 pandemic Swedish children’s physical activity, time spent outside on weekdays and weekend days, and screen time significantly increased (+53 min/day; +124 min/day; +68 min/day; +30 min/day, respectively; all p-values ≤ 0.001).</p>

Comments	Parent report for COVID-19 rather than measured as pre-COVID. Children were a year older in the COVID-19 study compared to the SUNRISE study. Only COVID-related results reported.
CHARACTERISTIC	SUMMARY
Reference	Giannopoulou I, Efstathiou V, Triantafyllou G, Korkoliakou P, Douzenis A. Adding stress to the stressed: Senior high school students' mental health amidst the COVID-19 nationwide lockdown in Greece. Psychiatry Res 2020:113560. doi:10.1016/j.psychres.2020.113560.
Aims	To examine the impact of the nationwide lockdown on the levels of anxiety and depression among last year senior high school students preparing for the Panhellenic university entrance exam
Study design/setting	Cross-sectional online survey; 16-30 th April 2020. Nationwide lockdown (i.e. citizens could leave their house only for specific reasons and with a special permit) from 23 rd March.
Population	Final year high school students
Country	Greece
Method	<p>Recruitment: through social media and websites of educational news and an email invitation to students from cram schools (frontistiria)</p> <p>Measures: a mix of standardised measures (Generalized Anxiety Disorder-7 and The Patient Health Questionnaire-9 (PHQ-9) Modified for Teens) and bespoke questionnaire (Lockdown experienced distress measure). Participants were asked about their symptoms of anxiety and depression over the first two weeks of February (prior to nationwide lockdown - baseline) and anxiety and depressive symptoms during the past two weeks (during lockdown - current)</p> <p>Analysis: Descriptive statistics (mean and standard deviation) for continuous measures and absolute and relative (%) frequencies for categorical variables. Simple comparisons</p>

	<p>between groups were performed using independent samples t tests for quantitative variables and the chi-squared test for categorical variables.</p> <p>A two-way mixed analysis of variance (ANOVA) was performed to assess the within-person changes, i.e. prior to the lockdown (baseline) versus past two weeks (current) and the main effect of sex (male vs female) on the levels of anxiety and depression symptoms. In addition, McNemar test was used to examine within individual changes in symptom severity according to measures' cut off points.</p> <p>Two-stage multiple regression analyses were carried out to identify significant predictors of self-report GAD-7 and PHQ-9 current scores (dependent variables). Independent predictor variables included in the analysis were sex, baseline depression symptoms severity and baseline anxiety symptoms severity and lockdown distress measure.</p>
Results	<p>442 students took part; 304 (68.8%) girls and 138 (31.2%) boys.</p> <p>There was a significant increase in GAD-7 and PHQ-9 severity scores from one month prior to the lockdown to during the lockdown period, with girls scoring significantly higher than boys at both points in time.</p> <p>The proportion of all respondents who screened positive for anxiety (GAD-7 ≥ 11) increased from 28.3% before the pandemic to 49.5% for the time of home confinement (McNemar test $p < 0.0001$) and of those scoring within the severe anxiety range (GAD-7 ≥ 17) increased from 3.8% to 20.5% (McNemar test $p < 0.0001$).</p> <p>The proportion of all respondents who scored above the PHQ-9 cut off 11 or greater indicating positive screen for depression increased from 48.5% before the pandemic to 63.8% for the time of home confinement (McNemar test $p < 0.0001$) and of those scoring within the severe depression range (PHQ-9 ≥ 20) increased from 10% to 27% ($p < 0.001$).</p> <p>The proportion of respondents who reported having thoughts that they would be better off dead, or of hurting themselves in some way increased from 25.9% before the pandemic to 29.7% during the lockdown period (McNemar test $p < 0.05$). More specifically, the proportion of those who reported having these thoughts nearly every day increased from 6% before the pandemic to 11.1% during the lockdown.</p> <p>The comorbidity, defined as positive screen for depression and anxiety, increased from 24% to 45% (McNemar-Bowker test $p < 0.0001$); for females from 28.1% to 48%</p>

	<p>(McNemar-Bowker test $p < 0.0001$), and for males from 14.8% to 37.8% (McNemar-Bowker test $p < 0.0001$).</p> <p>Higher baseline anxiety symptoms score ($\beta = 0.209$, $p < 0.001$) and greater lockdown experienced distress ($\beta = 0.607$, $p < 0.001$) were significantly associated with higher anxiety levels in time of home confinement.</p> <p>Higher baseline depression symptoms severity score ($\beta = 0.409$, $p < 0.001$) and greater lockdown experienced distress ($\beta = 0.603$, $p < 0.001$) were significantly associated with higher depression symptoms score in time of home confinement</p>
Comments	Participant recall for baseline – might expect anxiety etc. to increase as exam time approached, rather than effect of lockdown measures or is it to do with concerns about future uncertainty.

CHARACTERISTIC	SUMMARY
Reference	Graber KM, Byrne EM, Goodacre EJ, Kirby N, Kulkarni K, O’Farrelly C, et al. A rapid review of the impact of quarantine and restricted environments on children’s play and the role of play in children’s health. Child Care Health Dev 2020. doi:10.1111/cch.12832.
Aims	To collate the available evidence on the impact of quarantine and isolation on children’s play, and to investigate whether play might mitigate any adverse effects of quarantine or isolation on children’s health and educational outcomes
Study design	Rapid review
Search strategy	<p>Databases: PsycInfo, ERIC, and PubMed between 21st – 25th April supplemented by hand searching of references</p> <p>Search terms: relating to children and young people, quarantine and restricted environments, and play and activities</p>
Inclusion criteria	<ul style="list-style-type: none"> peer-reviewed research reports,

	<ul style="list-style-type: none"> • involving participants under age 18, • participants experiencing quarantine or related restricted environments, • assessment of (or collected data on) educational, developmental, or health related outcomes, • referencing play • published in English
Exclusion criteria	Not stated
Countries	USA (n=9), Canada (n=2), and one study each from Australia, Ireland, Israel, and Palestine.
Method	<p>Screened at title and abstract for eligibility. After initial screening, any papers where there was uncertainty about whether they met inclusion criteria were flagged and discussed by the authors to reach consensus. The articles selected for inclusion were then also screened by at least one other author to ensure adherence to criteria.</p> <p>Narrative synthesis</p>
Results	<p>15 studies met the inclusion criteria. Participants' ages ranged from 5 months to 21 years, and sample sizes ranged from 1 to 295. Studies were conducted in various types of restricted environments, including hospitals (n=7), juvenile (n=4) and immigration (n=3) detention centres, and a refugee camp (n=1). Of the studies that reported on duration (n=7), the length of time participants spent in restricted environments ranged from 48 hours to 330 days.</p> <p>Nine studies addressed how restricted environments may affect children's play experiences. The included literature described the impact of restrictions on children's access to and frequency of engaging in play, as well as on expressiveness and social connectedness through play.</p> <p>Ten studies looked at how play might mitigate the effects of quarantine or restriction on children's outcomes. Five papers considered play as a means of expression and play to promote coping. Three papers considered ways in which play for skill development might</p>

	<p>assuage difficult aspects of restricted environments. Four studies examined possible support stemming from play and social connectivity in restricted environments.</p> <p>Barriers to play were identified, such as unsafe spaces, scarcity of toys, lack of interaction with other children, and lack of time outdoors, and reports indicated that diminishing opportunities for play were associated with inactivity and boredom among children. Relatively few studies characterised changes in the nature of children's play in restrictive environments.</p> <p>In the studies involving adolescents in juvenile detention centres, engagement in creative, expressive activities afforded opportunities for social connectivity and development of social skills, which is particularly important during early adolescence. Children restricted to hospital environments also expressed a desire for more social connectivity via drawings depicting play areas, friends, shared spaces, and technological activities for play and communication.</p> <p>None of the included studies directly examined the impact of social or gathering restrictions on play due to infectious disease outbreak.</p>
Comments	

CHARACTERISTIC	SUMMARY
Reference	Marchant E, Todd C, James M, Crick T, Dwyer R, Brophy S. Primary school staff reflections on school closures due to COVID-19 and recommendations for the future: a national qualitative survey. MedRxiv 2020. doi:10.1101/2020.11.06.20227108.
Aims	To reflect on primary school staffs' experience of school closures and the initial reopening of schools and to identify recommendations for the future and a return to full-time education.
Study design/setting	Cross-sectional qualitative survey; July 2020
Population	Primary school staff (working with pupils aged 3-11)

Country	Wales
Method	<p>Recruitment: All primary schools in Wales (which include pupils from ages 3-11) were contacted via email through HAPPEN primary school network (Health and Attainment of Pupils in a Primary Education Network) inviting their staff to complete the survey. A snowball method was encouraged in which the representative from each school was asked to share the survey with staff within the primary school.</p> <p>Method: Online survey which consisted of open questions about the logistics of the phased reopening of schools, the experiences of staff regarding benefits/negative effects of lockdown and school closures on children in their class/school, recommendations for a future lockdown/school closures, in addition to concerns and recommendations for the full-time reopening of schools.</p> <p>Analysis: Thematic analysis was used to generate themes based on survey responses to gain an understanding into the experiences of primary school staff during the period of school closures (March to July 2020) and the reopening of schools (September 2020)</p>
Results	<p>208 staff from 78 primary schools across 16 local authorities completed the survey. There were a mix of head teachers, deputy head teachers, teachers, teaching assistants, higher level teaching assistants, support staff and 6 other staff. 50% of school staff worked in schools with a proportion of pupils eligible for free school meals greater than the national average (>19%).</p> <p>School staff highlighted the importance of prioritising the health and wellbeing of pupils and staff, with school staff consistently mentioning the negative impact of school closures on children’s physical and mental health and social development. Significant concerns were expressed by school staff regarding wellbeing, anxiety and general mental health problems.</p> <p>Many teachers also felt that pupils were engaging in less physical activity during lockdown, and others perceiving a “lack of physical fitness”. In addition, weight gain was highlighted by a number of teachers.</p> <p>On the phased reopening, school staff noticed large variation in children’s abilities and the support children had received while at home. A significant concern was the regression of key skills and knowledge during the period of school closures.</p>

	<p>School staff also raised concerns that their own wellbeing had been ignored during the period of school closures and returning to school. School staff responses regarding lockdown and remote learning included the challenges of combining work and home life in not being able to 'switch off'.</p> <p>Concerns were also raised about staff wellbeing in relation to adhering to social distancing and the lack of contact with other school staff.</p> <p>Fears regarding infection transmission within the school setting were highlighted consistently, and school staff called for scientific evidence to support the return to school. Other transmission concerns amongst staff were raised by those deemed as high risk, or with vulnerable family members.</p> <p>The importance of the home learning environment during school closures was highlighted as a key factor in children's learning progression. School staff spoke about some of the benefits of engaged parents providing one-to-one attention to their children. Engaged parents was also reflected in improved relationships with and communication between the school and parents. School staff highlighted wide variations in home learning provision.</p> <p>During lockdown and school closures, teaching was achieved primarily through digital methods requiring children to engage with remote learning online. School staff highlighted that this acted as a barrier to progression with learning for some children. Competing demands for use of digital technology within the household prevented children from learning. Parents with lower digital competence skills and a lack of access to digital equipment were contributing to widening gaps.</p> <p>The reduced numbers in class during the phased return to school allowed for a focus to be placed on whole-school wellbeing. In addition, it allowed extra support for pupils that required help.</p> <p>The enhanced cleaning and hygiene practices that schools need to adopt on return was also remarked upon as a concern of school staff in terms of the expectations, time taken and support.</p>
Comments	Those taking part may not be representative of wider population.

CHARACTERISTIC	SUMMARY
Reference	Nearchou F, Flinn C, Niland R, Subramaniam SS, Hennessy E. Exploring the Impact of COVID-19 on Mental Health Outcomes in Children and Adolescents: A Systematic Review. Int J Environ Res Public Health 2020;17. doi:10.3390/ijerph17228479.
Aims	To assess the impact of the COVID-19 pandemic on the mental health of children and adolescents
Study design	Systematic review
Search strategy	Databases: PsycINFO, MEDLINE, CINAHL, Scopus, PubMed, EMBASE, ERIC, and the WHO Global Health research database on COVID-19 Search terms: (covid* OR coronavirus* OR "novel coronavirus" OR nCOV OR quarant*) AND (psychiatr* OR psychologist* OR mental OR "mental health" OR "mental illness" OR "mental outcomes" OR "mental disorder") AND (child* OR adolescen* OR young OR youth OR teen* OR infant OR puberty) AND (survey* OR quant* OR qual* OR questionnaire) AND (depress* OR anxiety OR stress* OR "posttraumatic stress" OR PTSD OR wellbeing OR well-being OR mood* OR insomnia) in all fields of article
Inclusion criteria	<ul style="list-style-type: none"> • Quantitative, qualitative, mixed methods studies • Human studies • Peer-reviewed papers • Mental disorders • Neurodevelopmental disorders/any other disorder • Any mental health outcome COVID-19 related research • Children and young people 18 years and younger
Exclusion criteria	<ul style="list-style-type: none"> • Not in English • Studies that only included adults 18 years old or older

	<ul style="list-style-type: none"> • Studies that did not report age
Countries	China (n=7), Italy (n=2), Poland (n=1), Turkey (n=1), USA (n=1)
Method	Two researchers performed double title and abstract screening independently. Full text review by two researchers independently. Quality assessment was conducted (n = 12) by using the appropriate respective appraisal tool for each research design: the JBI Critical Appraisal Tool for Analytical Cross-Sectional Studies and the MMAT Methodological Quality Criteria for Descriptive studies were used. Studies were appraised against the screening criteria of the JBI and MMAT tools by two researchers independently. Studies were appraised as having low, moderate or high methodological quality. Narrative synthesis
Results	<p>12 studies met the inclusion criteria. All studies used quantitative cross-sectional designs and 11 were completed between 28th Jan. and 20th April 2020. 7 studies focused explicitly on children and adolescents (age range 3–18 years), 4 studies were conducted in the general population and 1 in university students, all five including sub-groups of young people aged 18 years old or younger. Sample size varied across studies from 17 to 8072 participants. Quality appraisal assessed the included studies of low (n = 3) or moderate (n = 9) quality.</p> <p>Six studies measured depression in young people: two studies reported mean scores of depression symptoms using Likert point ratings, with higher scores indicating higher levels of depression; three reported prevalence rates, while one did not report any descriptive statistics. The prevalence of depression in young people across the three studies that reported such information ranged from 22.6% to 43.7%. One study did not report mean scores of depression in their sample.</p> <p>Anxiety in young people was measured across seven of the included studies. The presence of anxiety symptoms was identified in 18.9% and 37.4% of young people measured by SCARED and GAD-7, respectively, in two studies. Four studies reported mean scores of anxiety using Likert-point scales, with higher scores indicating higher levels of anxiety, while one study did not report mean scores on anxiety at all</p> <p>Seven studies assessed emotional reactions specific to COVID-19. Of those, two studies did not provide mean scores or other related information. Three studies indicated that COVID-19-related emotional reactions are present in children and adolescents by reporting rates</p>

	<p>ranging from 22% to 62.2%. One study showed that fear of COVID-19 significantly predicted depressive, anxiety, and OCD symptoms in adolescents.</p> <p>Positive domains in young people’s lives were explored across three out of the 12 studies. These were belongingness, relationships with peers, hope, meaning in life and satisfaction with life. Feelings of greater belongingness were associated with engaging in social distancing as a result of parental enforcement.</p> <p>Two did not report age and gender differences in mental health outcomes. Reported mental health outcomes manifested differently across different age groups of young people and across study samples. One study found that younger children (3–6 years old) were more likely to present with clinginess and fear that family members could contract COVID-19, while older children (6–18 years old) were more likely to show inattention (although marginally) and persistent inquiry. Two studies suggested that older cohorts of young people are likely to report higher levels of symptoms of mental distress. Similarly, in an adolescent sample (12–18 years), older adolescents (senior high school) were more likely to report higher depression and anxiety symptoms than their younger counterparts (junior high school). Four studies found no evidence associating age with mental health symptoms.</p> <p>Of the four studies that examined gender differences in young people under 18 years of age, differences were evident in two studies, but only one study reported explicitly that females were more likely to report higher levels of depression and anxiety. The two remaining studies found no evidence of gender differences.</p> <p>Overall, the findings of the included studies suggested that COVID-19 emotional reactions and new social regulations (e.g., social distancing) were associated with a number of negative mental health outcomes in young people.</p>
Comments	<p>Covid-related search terms may have missed relevant articles as use of term ‘SARS-CoV-2’ and related terms are not reported as being used. No comparisons made to prevalence of mental health difficulties in pre-COVID populations of same age groups. Limited synthesis.</p>

CHARACTERISTIC	SUMMARY
Reference	OFSTED. COVID-19 series: briefing on early years, October 2020. Manchester: OFSTED; 2020.
Aims	To find out <ul style="list-style-type: none"> i) What is the current state of early year's provision? ii) How have children been affected by the first national lockdown? iii) How are early year's providers planning to maintain standards in education and care through the pandemic? iv) How financially sustainable is the early years sector?
Study design/setting	Cross-sectional; Telephone Interviews; 5-16 th October (first 2 weeks of data collection)
Population	Registered early years providers and maintained nursery schools
Country	England
Method	Providers were invited to take part in interview with Ofsted Inspectors.
Results	<p>208 early years providers took part in the interviews presented in this report. The vast majority of providers said that the first national lockdown had impacted on children's learning and development. Three main groups of children were identified: i) those who continued to attend the setting ii) those at home who were well supported by parents who were able to spend time with them and iii) those at home with parents who were not able to spend time with them. Particular concerns were raised about the learning and development of children with special educational needs and disabilities (SEND), those who spoke English as an additional language, children living in poverty and/or those whose parents were not engaging previously.</p> <p>Providers that stayed open said children who attended the setting continued to make the progress they expected. Providers thought that children who were at home also thrived when their parents were able to spend quality time with them. However, for children whose parents had not been able to spend time with them, providers felt that this had prevented</p>

	<p>some children from developing their language, communication and their physical skills. For example, some children had become more sedentary and others had become more reserved and withdrawn.</p> <p>Many children were more anxious and had struggled when they first returned to the setting, finding it difficult to separate from their parents. Some children were less confident with others and slower to join in. Others returned using nappies, comforters and dummies at an older age than providers would usually expect.</p> <p>A quarter of providers thought that no area of development had improved. However, around the same number thought that children's communication and language had improved, and slightly fewer thought physical development had improved. Providers said that parents who were able to spend more time talking to and reading with their children had had a positive impact on children's communication and language skills. They also noticed that some children had become more involved in daily routines, such as eating with parents and going on daily walks.</p>
Comments	Providers from private, voluntary and independent nurseries were over-represented. No supporting quotes in this report so unable to judge validity of conclusions. No information about recruitment process or analysis approach.

CHARACTERISTIC	SUMMARY
Reference	Scottish Government. COVID-19: Children, young people and families October 2020 Evidence Summary. Edinburgh: Children and Families Analytical Unit, Scottish Government; 2020.
Aims	To summarise the impact of COVID-19 on the wellbeing of children and families in Scotland.
Study design	Non-systematic selection of evidence sources from Scotland and other parts of the UK published mainly in September 2020.
Search strategy	Not applicable

Inclusion criteria	Not applicable
Exclusion criteria	In the main, early years and maternity, most aspects of physical health, in particular COVID-19 infection and transmission in children and young people and a detailed coverage of the impact of COVID-19 on education and learning has not been included
Countries	UK
Method	Not applicable
Results	<p>UK survey evidence suggests that key issues for young people as they came out of lockdown were concerns about COVID-19 transmission, adapting to COVID-19 measures in schools (physical distancing) and worries about future aspirations and longer term financial and job security. There are also reports of anxiety and fear associated with returning to 'the outside world'.</p> <p>There are a number of Scottish studies that indicate increasing concern about the impact of rising poverty on the wellbeing of children and families. The evidence suggests that worsening financial situations continue to have a detrimental effect on families' mental health, particularly those reliant on social security. In a University of Glasgow study of high poverty communities, services report an increase in new families in crisis, many of whom may not be known to services. Food poverty is highlighted in a number of Scottish studies with one survey by Includem reporting that nearly half of low income families surveyed struggle to put food on the table on a regular basis.</p> <p>Other common themes from wider UK evidence this month (consistent with previous briefings) were digital exclusion, overcrowding and/or poor quality housing and lack of outdoor space – all of which impact negatively on the wellbeing of families.</p> <p>Emerging UK evidence suggests that some children may have experienced a sustained loss of play and regular peer interaction during the pandemic. Younger (primary) age groups appear to be at greatest risk of loss of peer interaction (both online and in-person), with new evidence from the UK-wide Co-SPACE Study suggesting that this did not recover in the summer when many restrictions were lifted.</p> <p>UK-wide research by the Royal College of Paediatrics & Child Health reports that some children who were shielding (in particular) felt forgotten during lockdown, and felt that the</p>

	<p>messaging and support services were inappropriate and aimed at the over 70s. Key priorities for young people who have been shielding were to provide mental health support as they reintegrate into society and better communication and messaging.</p> <p>The most recent UK-wide Family Fund survey paints a worsening picture of the wellbeing of disabled and seriously ill children in the UK. Many families surveyed continue to struggle financially. Parental concern about the negative impact of COVID-19 on children’s physical health, mental health and children’s behaviour and emotions has remained very high, and in some cases increased over time.</p> <p>Wider UK evidence shows that for some children with special education needs and disabilities (SEND) school closures had a beneficial effect on their anxiety levels, with some parents considering home education as a long-term option.</p> <p>Research by Intercultural Youth Scotland reports BME young people’s feelings of disadvantage (compared to their white peers) in relation to their education in particular, and future opportunities as a result of COVID-19.</p> <p>Evidence continues to highlight care leavers as most at risk of mental health impacts due to experiences of loneliness and social isolation during lockdown which were exacerbated by lack of digital access.</p> <p>Scottish evidence reports that, throughout lockdown, services received reports of children being exposed to increased levels of abuse.</p> <p>There is some emerging UK evidence of an increase in online bullying during lockdown (YMCA survey). There are also indications of increases in online sexual abuse during the pandemic (based on data on UK-wide Childline and NSPCC helpline data).</p>
<p>Comments</p>	<p>Fourth in a series of high-level evidence summaries (all published online on the same day). Broad scope to cover a wide range of policy interests.</p> <p>Some of the summaries have been drawn from the NSPCC Learning series updates (CASPAR weekly update) and the Care Inspectorate Children and Young People Bulletin series.</p> <p>Mostly survey reports, rather than academic literature.</p>

CHARACTERISTIC	SUMMARY
Reference	Sherr L, Cluver L, Tomlinson M, Idele P, Banati P, Anthony D, et al. Beyond Masks: Societal impacts of COVID-19 and accelerated solutions for children and adolescents. Florence: UNICEF Office of Research – Innocenti; 2020.
Aims	To provide a landscape review to inform national COVID-19 response plans and country instruments to ensure the continued advancement of the rights of children across nations and contexts.
Study design	Rapid evidence review conducted in July 2020, supplemented by reviews from UNICEF staff and others in August-October 2020.
Search strategy	Not stated
Inclusion criteria	<ul style="list-style-type: none"> Published in English
Exclusion criteria	Not stated
Countries	Not stated
Method	<ul style="list-style-type: none"> In-depth literature reviews (including both published and grey literature) for each area on impacts and solutions. Contributors used keyword searches and systematic reviews of relevant databases, prioritizing randomized controlled trials and high-quality controlled studies or pre-post studies, including: <ul style="list-style-type: none"> available evidence from the current COVID-19 pandemic evidence from prior epidemics: HIV/acquired immunodeficiency syndrome (AIDS), tuberculosis (TB), Ebola and Zika evidence from low-resource settings and contexts of weak service infrastructure evidence from new digital technologies

	<ul style="list-style-type: none"> • Interventions were then synthesized across reviews, tabulated for each theme area and combined across theme areas to provide swift evidence summaries. • Cross-review synthesis was conducted to identify shared and differing outcomes and solutions.
Results	<ul style="list-style-type: none"> • Children can both be infected by and transmit the SARS-CoV2 virus. • COVID-19 response may crowd out access to regular child-related healthcare services such as immunization and maternal and new-born care. • Greater attention is required to understand the full impact of hospitalisation and illness on children, and of illness and death among their caregivers, relatives and community • The current evidence indicates that the direct health impact of COVID-19 on children and adolescents is generally lower than for adults, but there are worrying signs that young adults are increasingly at risk of infection • Children living with HIV and other chronic illnesses could be particularly at risk from COVID-19 • Access to safe, quality and affordable childcare is often a vital service to help support children during the pandemic • Lockdowns are likely to be associated with increased physical inactivity among children and adolescents, with negative consequences for their health and well-being • Disruptions to social networks and relations, and social isolation can have numerous adverse effects on children and adolescents • Narrating their experiences of the crisis has become an important coping mechanism for children and adolescents
Comments	<p>UNICEF 6 point plan:</p> <ol style="list-style-type: none"> 1. Ensure all children learn, including by closing the digital divide. 2. Guarantee access to primary health care and make vaccines affordable and available to every child.

	<ol style="list-style-type: none"> 3. Support and protect the mental health of children and young people and bring an end to abuse, gender-based violence and neglect in childhood. 4. Increase access to clean water, sanitation and hygiene and address environmental degradation and climate change. 5. Reverse the rise in child poverty and ensure an inclusive recovery for all. 6. Redouble efforts to protect and support children and their families living through conflict, disaster and displacement.
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CHARACTERISTIC	SUMMARY
Reference	Skripkauskaitė, S., Pearcey, S., Raw, J., Shum, A., Waite, P., Creswell C. Co-Space Report 6: Changes in children mental health symptoms from March to October 2020
Aims	The Co-SPACE project is tracking the mental health of school-aged children and young people aged 4-16 years throughout the COVID-19 crisis
Study design/setting	An online survey is sent out and completed on a monthly basis by parents/carers and young people (if aged 11-16 years) throughout the pandemic. This report provides an overview of monthly data from 7,192 parents/carers. These participants completed the survey at least once since the start of the UK lockdown (between 30/03/2020 and 31/10/2020).
Population	Children aged 4-16 years
Country	United Kingdom
Method	<p>Recruitment: through a variety of means, including social media, distribution through partner organisations, networks and charities, the media and targeted online advertising.</p> <p>Measures: the focus in this report are outcomes measured by the conduct problems, emotional symptoms and hyperactivity/inattention subscales of the SDQ.</p> <p>Analysis: Results are presented for</p>

	<ul style="list-style-type: none"> • The whole sample • Gender female or male); • Age (primary school aged [4-10 years] or secondary school aged [11-17 years]) • Age and gender (primary aged female or male and secondary aged female or male) • Special educational needs and/or neurodevelopmental differences (SEN/ND or no SEN/ND) • Household income (more or less than £16,000 per year, i.e., below the poverty line).
Results	<p>Overall, both parent/carer reported behavioural difficulties and restless/attentional difficulties consistently increased through March to June and have decreased since July. Reported emotional difficulties were relatively stable through March to June, but have also decreased over time after the lockdown was eased in June.</p> <p>On average, parents/carers reported higher levels of behavioural and restless/attentional difficulties for boys than girls. However, they reported higher average emotional difficulties scores for girls than boys. The patterns of parent/carer reported behavioural, emotional, and restless/attentional difficulties over time were relatively similar for boys and girls.</p> <p>On average, parents/carers reported higher levels of behavioural and restless/attentional difficulties for primary than secondary school aged children. They reported similar levels of emotional difficulties for both groups. Over the March to June (lockdown) period, there were increases in parents/carer reported behavioural, emotional, and restless/attentional difficulties for primary school aged children. From September to October (when most children and young people returned to school), reported behavioural difficulties decreased. For secondary school aged children, there was a decrease in parent/carer reported emotional difficulties at the start of the lockdown (March-April) but patterns were relatively stable for behavioural and restless/attentional difficulties, over this time. There was a slight decrease in parents/carer reported restless/attentional difficulties for secondary school aged children from August to September, but relatively little change in behavioural and emotional difficulties.</p> <p>On average, parents/carers reported higher levels of behavioural and restless/attentional difficulties for primary school aged boys than girls. They reported similar levels of emotional difficulties for both groups. Over the March to June period, restless/attentional</p>

difficulties in primary school aged children were reported to increase earlier among boys (April) than girls (May). The patterns of behavioural and emotional difficulties over this time were relatively similar for primary school aged boys and girls. For both, boys and girls, behavioural difficulties increased through from April to June and decreased from July to October. Similarly, emotional difficulties increased between April and May, but decreased in July and September.

On average, parents/carers reported higher levels of behavioural and restless/attentional difficulties for secondary school aged boys than girls. They, however, reported higher levels of emotional difficulties for girls than boys in this age group. Levels of behavioural difficulties have remained relatively stable since March and similar for both secondary school aged boys and girls. Emotional difficulties have, however, been reported to slightly increase between July and August for the girls, but not the boys, in the secondary age group. Conversely, restless/attentional difficulties have been reported to decrease more for secondary school aged boys than girls in June/July, but decrease similarly for both boys and girls in August/September.

On average, parents/carers reported substantially higher levels of all behavioural, emotional, and restless/attentional difficulties for children with SEN/ND than children without SEN/ND. For children with SEN/ND, levels of behavioural, emotional, and restless/attentional difficulties remained relatively stable across the whole time period. However, for children without SEN/ND, reported behavioural, emotional, and restless/attentional difficulties increased from March to June and then decreased from July onwards.

On average, parents/carers from households with lower annual income (< £16,000 p.a.) reported higher levels of all behavioural, emotional, and restless/attentional difficulties than parents/carers from households with higher annual income (> £16,000 p.a.). Increases in behavioural difficulties were reported from July to August by parents/carers with an annual household income under £16,000, but not those with annual income over £16,000. Reported restless/attentional difficulties, however, were relatively stable, albeit higher, for the children from lower income households, whereas for children from higher income households restless/attentional difficulties peaked in July. In both household income groups, the pattern of emotional difficulties was reported to be relatively stable overtime, with a slight decrease in September.

Comments	92.4 % of 7,192 participants included were female, presumably mothers. Furthermore, the majority of the sample was employed, either part-time (35.7 %) or full-time (36.7 %), had an average income of >16,000 (84.9 %), were white (93.2 %), and resided in Southern England (50.7 %). Co-SPACE participants residing in Scotland were not included due to difficulties interpreting patterns across participants (The school year in Scotland usually begins in the second or third week of August, whereas in England, Wales and Northern Ireland, it starts at the beginning of September). Parent report
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Parents' perspectives

CHARACTERISTIC	SUMMARY
Reference	Goldman RD, Yan TD, Seiler M, Parra Cotanda C, Brown JC, Klein EJ, et al. Caregiver willingness to vaccinate their children against COVID-19: Cross sectional survey. Vaccine 2020;38:7668–73. doi:10.1016/j.vaccine.2020.09.084.
Aims	To investigate predictors associated with global caregivers' intent to vaccinate their children against COVID-19.
Study design/setting	International cross-sectional survey; 26 th March – 31 st May 2020. This study is part of a larger COVID-19 Parental Attitude Study (COVIPAS) of caregivers presenting for emergency care for their children during COVID-19.
Population	Caregivers who attended, with their children, 16 paediatric emergency departments (ED) across 6 countries
Country	US, Canada, Israel, Japan, Spain, Switzerland
Method	Recruitment: posters placed in waiting areas and patient rooms, and direct approach by healthcare team members Method: Caregivers completed survey on their own smartphone by logging onto a secure online platform based on REDCap metadata-driven software. A bespoke questionnaire asked about demographic characteristics, information on the ED visit, and attitudes around COVID-19. Pilot testing for face and content validity for all items of the survey was

	<p>completed <i>apriori</i> by 10 individuals representing the target group of caregivers and by 10 healthcare providers working in the ED environment. This paper reports responses to the question: ‘There is no vaccine/immunization currently available for Coronavirus (COVID19). If a vaccine/immunization was available today, would you give it to your child?’ followed by an open-ended question ‘‘Why?’’ or ‘‘Why not?’’, with a free text box.</p> <p>Analysis: Basic descriptive statistics and frequencies were used to describe all variables, comparing survey data from caregivers who would vaccinate their children against COVID-19 and those that would not. Univariate analyses: Mann-Whitney test for comparing non-normal continuous variables, independent t-test for comparing normally distributed continuous variables, and Chi-square or Fisher’s exact test for categorical variables. Multivariable logistic regression analysis to estimate the adjusted odds ratio of agreeing to vaccinate children, using all the variables that showed significance ($p < 0.1$) in the univariate analysis. To compare caregiver concern of their child having COVID-19 (score 0–10) to willingness to vaccinate, we used the Mann-Whitney U test.</p> <p>The description of each free text response was categorized into themes using an inductive approach by one author and reviewed for completeness by another author. Free text responses that were blank were categorized as no comment. Themes were analysed for frequencies of responses by participants.</p>
<p>Results</p>	<p>Responses from 1541 caregivers was included: 1005 (65.2%) indicated that they would have their child vaccinated for COVID, 509 (33%) said they would not and 27 (1.8%) did not answer the question. The median age of children was 7.5 (Standard Deviation (SD) = 5.0) years and the median age of caregivers was 39.9 (SD = 7.6) years. 28 (1.8%) children had a potential contraindication to live vaccines.</p> <p>In the univariate analysis, greater willingness to vaccinate was associated with older children ($p = 0.009$), children that were up-to-date on their vaccines ($p < 0.001$), children with no chronic illness ($p = 0.096$), when fathers completed the survey ($p = 0.002$), if the caregiver was older ($p < 0.001$), if the child ($p < 0.001$) or the caregiver ($p < 0.001$) reported they were immunized against influenza in the last year, and if the caregiver was more concerned about their child ($p < 0.001$) or themselves ($p < 0.001$) having COVID19 when arriving to the ED.</p> <p>The multivariate logistic regression analysis revealed that factors predicting willingness to vaccinate against COVID-19 were the child’s age (Odds Ratio (OR) = 1.03, 95% confidence</p>

	<p>interval (CI) 1.00–1.05, $p = 0.033$), child’s vaccination was reported by caregivers to be up-to-date (OR = 2.57, 95% CI 1.81–3.68, $p < 0.001$), child (OR = 1.49, 95% CI 1.09–2.05, $p = 0.013$), caregiver (OR = 2.08, 95% CI 1.55–2.8, $p < 0.001$) vaccination against influenza in the past year, and caregiver concern that the child had COVID-19 (OR = 1.08, 95% CI 1–1.17, $p = 0.048$). Factors predicting lack of willingness to vaccinate were mothers completing the survey (OR = 0.62, 95% CI 0.47–0.81, $p < 0.001$) and the child having a chronic illness (OR = 0.66, 95% CI 0.47–0.95, $p = 0.022$).</p> <p>Seven themes were identified among caregivers willing to vaccinate their children against COVID-19: protect the child, protect others, general vaccine acceptance, perceived pandemic severity, high risk child or family member, accepting but concerns of efficacy/safety, and desire to return to normal.</p> <p>Seven themes were identified among caregivers not willing to vaccinate: novelty, perceived child is not at risk to contract COVID-19, side effects/safety concerns, efficacy concerns, general vaccine refusal, perceived contraindication, and may vaccinate if more information available/recommended by healthcare provider.</p>
Comments	<p>It is not possible to tell what the response rate to the survey was. The numbers completing the survey in each country was relatively small: US $n=317$, Canada $n=542$, Switzerland $n=438$, Spain $n=124$, Israel $n=91$, Japan $n=29$. There is no demographic information given in this report, so it is not possible to tell how representative those taking part of the wider population were. Recruitment process may have introduced a source of bias i.e. caregivers may have answered the question in a way that they perceived to be socially desirable to the healthcare provider (given the direct approach). Also use of smartphone technology.</p>

CHARACTERISTIC	SUMMARY
Reference	Hodson A, Woodland L, Smith LE, Rubin GJ. Parental perceptions of COVID-19-like illness in their children. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.05.20226480.
Aims	To explore parents’ perceptions of COVID-19-like symptoms in their child and attitudes towards isolating from others in the household when unwell.

Study design/setting	Qualitative, semi-structured interviews; 15 th – 21 st April 2020.
Population	Parents of children between 4 and 18 years
Country	England
Method	<p>Recruitment: not stated</p> <p>Method: Qualitative semi-structured telephone interviews. Parents were asked whether their child had had “coronavirus or coronavirus symptoms, either a high temperature or new continuous cough?” as well as about whether the parent or child would find it difficult to self-isolate and how they would cope with self-isolation.</p> <p>Analysis: Thematic analysis.</p>
Results	<p>30 parents took part. Four themes related to the topic ‘symptom attribution’ were identified; normalising symptoms, err on the side of caution, experience of temperature, symptoms not normal for us. Symptoms were often attributed to a non-COVID explanation, particularly if symptoms were transitory or mild, that reduced the perceived risk and, thus, the intention to isolate. However, some participants expressed a view that “any symptoms” should be treated as if they were COVID-19 related (“err on the side of caution”). Some parents indicated that they would be more likely to attribute high temperature than a cough to COVID-19 (“experience of temperature”). While a cough could be put down to a sore throat or common cold, parents appeared more cautious about a temperature. There was a sense among some participants that unexpected or unusual symptoms would be a particular cause for concern (“symptoms not normal for us”).</p> <p>Also, four themes were identified related to the topic ‘ability to isolate’; difficult to prevent contact with children, isolation would be no different to lockdown life, ability to get food and supplies, limited space. Parents had varied beliefs about their ability to isolate from others in the home and particularly the difficulty of isolating from children (“difficult to prevent contact with children”). Across interviews, parents expressed that this was related to their child’s age and their understanding of the virus, A common, fatalistic sentiment was that if one member of their household presented symptoms of COVID-19, then the whole household would catch it. Some parents noted that it would be easy to isolate the entire household as it would be no different to how they were already living during lockdown. Access to additional help or available resources was identified as impacting</p>

	parents' ability to isolate. Some parents identified that the size of the home would be an additional challenge during self-isolation.
Comments	Part of larger study reported elsewhere. This paper focusses on responses relating to symptom perception, attribution, and how parents thought they would react to the presence of symptoms among their children. Intention to act may differ from actual behaviour. There is no information about how parents were recruited to take part in this study. There is no socio-demographic information given, including age of child. It is not possible to tell what proportion of parents (e.g. majority or minority) held the different points of view – all are quantified as 'some'. Carried out early in the pandemic when testing was limited and social restrictions were at their strictest.

Inequality

CHARACTERISTIC	SUMMARY
Reference	Spencer N, Nathawad R, Arpin E, Johnson S. Pandemics, epidemics and inequities in routine childhood vaccination coverage: a rapid review. <i>Bmjpo</i> 2020;4:e000842. doi:10.1136/bmjpo-2020-000842.
Aims	To synthesise published evidence for the impact of pandemics and epidemics, including COVID-19, on inequities in routine childhood vaccination coverage.
Study design	Rapid evidence review
Search strategy	Databases: Ovid MEDLINE(R); MEDLINE Daily; MEDLINE Epub Ahead of Print and In Process & Other Non-Indexed Citations; Embase; Web of Science; Cochrane Central; Cochrane CDSR; Sociological Abstracts; ASSIA; and MedRxiv to week 2 June 2020. Search terms related to Population: children aged 0–18 years; Intervention/exposure: pandemic, epidemic, COVID-19, SARS, Middle East respiratory syndrome, H1N1; Comparison: inequality/inequity; Outcome: immunisation, vaccination coverage

Inclusion criteria	Papers reporting data on social, regional or gender inequality in reductions in routine childhood vaccination coverage during any pandemic or epidemic. No language restrictions were imposed.
Exclusion criteria	Not stated
Countries	N/A
Method	Abstracts were independently screened by three authors who selected papers for full review which were then independently evaluated against the inclusion criteria by the same authors. Differences were resolved by consensus.
Results	<p>Twenty-eight papers were selected for full paper review and one additional paper was identified in secondary search of references.</p> <p>No publications meeting the inclusion criteria was identified by the search.</p>

APPENDIX 3: Excluded studies

Reference	Exclusion Reason
Bauer KW, Chriqui JF, Andreyeva T, Kenney EL, Stage VC, Dev D, et al. A Safety Net Unraveling: Feeding Young Children During COVID-19. <i>Am J Public Health</i> 2020:e1–4. doi:10.2105/AJPH.2020.305980 .	Full text not available
Burns A, Gutfraind A. Symptom-Based Isolation Policies: Evidence from a Mathematical Model of Outbreaks of Influenza and COVID-19. <i>MedRxiv</i> 2020. doi:10.1101/2020.03.26.20044750 .	Modelling study
Cuschieri S, Grech S. COVID-19: a one-way ticket to a global childhood obesity crisis? <i>J Diabetes Metab Disord</i> 2020:1–4. doi:10.1007/s40200-020-00682-2 .	Commentary or editorial or letter or opinion or position statement or news article or policy brief
de Figueiredo CS, Sandre PC, Portugal LCL, Mázala-de-Oliveira T, da Silva Chagas L, Raony Í, et al. COVID-19 pandemic impact on children and adolescents' mental health: Biological, environmental, and social factors. <i>Prog Neuropsychopharmacol Biol Psychiatry</i> 2020:110171. doi:10.1016/j.pnpbp.2020.110171 .	Commentary or editorial or letter or opinion or position statement or news article or policy brief
Every-Palmer S, Jenkins M, Gendall P, Hoek J, Beaglehole B, Bell C, et al. Psychological distress, anxiety, family violence, suicidality, and wellbeing in New Zealand during the COVID-19 lockdown: A cross-sectional study. <i>PLoS ONE</i> 2020;15:e0241658. doi:10.1371/journal.pone.0241658 .	Adult population
Government of Canada. Evaluating COVID-19 disease transmission and public health measures in schools: Outbreak investigation guidance . 2020.	Guidance
Grove G, Ziauddeen N, Alwan NA. Symptoms suggestive of COVID-19 in households with and without children: a descriptive survey. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.09.20228205 .	Wrong outcomes

<p>Hertz MF, Barrios LC. Adolescent mental health, COVID-19, and the value of school-community partnerships. <i>Inj Prev</i> 2020. doi:10.1136/injuryprev-2020-044050.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or policy brief</p>
<p>Khudov H., Tyurina V., Ovod Y., Kozyr M., Chala A., Khizhnyak I. The Ways of Psychological and Pedagogical Barriers Overcoming between Teachers and Students during COVID-19 Pandemic. <i>Systematic Reviews in Pharmacy</i> 2020;11:373–9. doi:10.1136/injuryprev-2020-044050.</p>	<p>Wrong outcomes</p>
<p>Li Y, Campbell H, Kulkarni D, Harpur A, Nundy M, Wang X, et al. The temporal association of introducing and lifting non-pharmaceutical interventions with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 131 countries. <i>Lancet Infect Dis</i> 2020. doi:10.1016/S1473-3099(20)30785-4.</p>	<p>Modelling study</p>
<p>Lusk P. Addressing the mental health needs of children/adolescents, families, and ourselves during our unprecedented COVID-19 times. <i>J Child Adolesc Psychiatr Nurs</i> 2020;33:185–6. doi:10.1111/jcap.12297.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or policy brief</p>
<p>Manivannan M, Jogalekar MP, Kavitha MS, Maran BAV, Gangadaran P. A mini-review on the effects of COVID-19 on younger individuals. <i>Exp Biol Med (Maywood)</i> 2020:1535370220975118. doi:10.1177/1535370220975118.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or policy brief</p>
<p>Mauras S, Cohen-Addad V, Duboc G, Dupre la Tour M, Frasca P, Mathieu C, et al. <i>Analysis of mitigation of Covid-19 outbreaks in workplaces and schools by hybrid telecommuting. MedRxiv 2020.</i> doi:10.1101/2020.11.09.20228007.</p>	<p>Modelling study</p>
<p>Naimark D, Mishra S, Barrett K, Khan YA, Mac S, Ximenes R, et al. The potential impact of School Closure Relative to Community-based Non-pharmaceutical Interventions on COVID-19 Cases in Ontario, Canada. <i>MedRxiv 2020.</i> doi:10.1101/2020.11.18.20234351.</p>	<p>Modelling study</p>

National Academies of Sciences, Engineering, and Medicine; Committee on Guidance for K-12 Education on Responding to COVID-19. Reopening K-12 Schools During the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities. Washington (DC): National Academies Press (US); 2020. doi:10.17226/25858 .	Guidance
Report 35 - COVID-19 How can we keep schools and universities open? Differentiating closures by economic sector to optimize social and economic activity while containing SARS-CoV-2 transmission Faculty of Medicine, Imperial College London	Modelling study
Schmidt PW. Inference under Superspreading: Determinants of SARS-CoV-2 Transmission in Germany 2020.	Modelling study
Scott N, Palmer A, Delport D, Abeysuriya R, Stuart RM, Kerr CC, et al. Modelling the impact of relaxing COVID-19 control measures during a period of low viral transmission. Med J Aust 2020. doi:10.5694/mja2.50845 .	Modelling study
Scottish Government Coronavirus (COVID-19): impact of restrictions on children and young people - CRWIA - stage 3	Commentary or editorial or letter or opinion or position statement or news article or policy brief
Scottish Government. Coronavirus (COVID-19): impact on children, young people and families - evidence summary July 2020	Information published before October 2020
Scottish Government. Coronavirus (COVID-19): impact on children, young people and families - evidence summary June 2020	Information published before October 2020
Scottish Government. Coronavirus (COVID-19): impact on children, young people and families - evidence summary September 2020	Information published before October 2020
The impact of COVID-19 on education: Insights from Education at Glance 2020 - Digital Inclusion Atlas	Wrong outcomes

<p>Thompson H, Mousa A, Dighe A, Fu H, Arnedo-Pena A, Barrett P, et al. Report 38: SARS-CoV-2 setting-specific transmission rates: a systematic review and meta-analysis. Imperial College London 2020. doi:10.25561/84270.</p>	Wrong setting
<p>Tomasik MJ, Helbling LA, Moser U. Educational gains of in-person vs. distance learning in primary and secondary schools: A natural experiment during the COVID-19 pandemic school closures in Switzerland. Int J Psychol 2020. doi:10.1002/ijop.12728.</p>	Modelling study
<p>UNICEF. Averting a lost COVID generation A six-point plan to respond, recover and reimagine a post-pandemic world for every child.</p>	Commentary or editorial or letter or opinion or position statement or news article or policy brief
<p>Vora KS, Sundararajan A, Saiyed S, Dhama K, Natesan S. Impact of COVID-19 on women and children and the need for a gendered approach in vaccine development. Hum Vaccin Immunother 2020;1-6. doi:10.1080/21645515.2020.1826249.</p>	Wrong outcomes
<p>Wales Government Technical Advisory Group: evidence review on children and young people under 18 in preschool, school or college following the firebreak</p>	Commentary or editorial or letter or opinion or position statement or news article or policy brief
<p>Waterfield T, Watson C, Moore R, Ferris K, Tonry C, Watt A, et al. Seroprevalence of SARS-CoV-2 antibodies in children: a prospective multicentre cohort study. Arch Dis Child 2020. doi:10.1136/archdischild-2020-320558.</p>	Included in previous report as pre-print
<p>Willem L, Abrams S, Petrof O, Coletti P, Kuylen E, Libin P, et al. The impact of contact tracing and household bubbles on deconfinement strategies for COVID-19: an individual-based modelling study. MedRxiv 2020. doi:10.1101/2020.07.01.20144444.</p>	Modelling study

COVID-19 in Children and Young People: Literature Scanning Report 6 (30.10.20-6.11.20)

Research question

What is the current knowledge about Covid-19 and children and young people?

Method

The search strategy and inclusion/exclusion criteria are outlined in Appendix 1 (page 13). The titles and abstracts were screened against the agreed inclusion and exclusion criteria for possible inclusion in this report. This screening identified 57 papers for further consideration. The full text of each was assessed and 12 met the inclusion criteria. In addition, there was one study from a previous search that has been added after the full text became available from the British Library. Details of the included studies can be found in Appendix 2 (page 15) and the excluded studies in Appendix 3 (page 47). In this report, references that are highlighted in **red font** are pre-print publications. Papers that might be of particular interest and/or to raise awareness to the advisory group are highlighted in **purple font** and listed on page. Hyperlinks to the original articles are included, where they are available.

Key messages

- The evidence base about children and young people's role in the transmission of SARS-CoV-2 continues to develop. For example, a retrospective analysis of routinely collected information in England found that living with children aged 0-11 years was not associated with recorded SARS-CoV-2 infection, COVID-19 related hospital or ICU admission. For adults younger than 65 years, living with children aged 12-18 years was found to be associated with a small increased risk of recorded SRS-CoV-2 infection but not with COVID—19 related hospital or ICU admission.
- A population-based study in Norway found that teachers and childcare workers did not have an increased risk of confirmed COVID-19 than the general working age population. Once infected, pre-school teachers and childcare workers had a small increased risk (1-2 times) of being hospitalised compared to the general working age population. However, overall there was a small number of hospitalisations, so this finding should be treated with a degree of caution.
- The impact of the pandemic and the public health control measures on children and young people's physical and mental health are a field of considerable research activity. There is emerging evidence about the adverse impact of social restrictions on adolescents' mental health and wellbeing. For example, in a study in America, between October 2019 and April 2020, significant increases in depressive and anxiety symptoms and loneliness of adolescents were found. However, the overall evidence base is currently weak. Many studies rely on cross-sectional designs with recruitment

processes that introduce a source of bias. Often, it is not possible to tell how representative of the general population those taking part are. Thus, it is difficult to draw firm conclusions from these studies.

Reports of potential interest

Papers included in this report

- Magnusson K, Nygard KM, Vold L, Telle KE. Occupational risk of COVID-19 in the 1st vs 2nd wave of infection. *MedRxiv 2020*. [doi:10.1101/2020.10.29.20220426](https://doi.org/10.1101/2020.10.29.20220426).
- Forbes H, Morton CE, Bacon S, McDonald HI, Minassian C, Brown J, et al. Association between living with children and outcomes from COVID-19: an OpenSAFELY cohort study of 12 million adults in England. *MedRxiv 2020*. [doi:10.1101/2020.11.01.20222315](https://doi.org/10.1101/2020.11.01.20222315).

Papers not included in this report

The following studies and reports did not meet the inclusion criteria for this report. Nevertheless, they may be of interest to the advisory group.

Modelling studies

- Shea K, Borchering RK, Probert WJ, Howerton E, Bogich TL, Li S, et al. COVID-19 reopening strategies at the county level in the face of uncertainty: Multiple Models for Outbreak Decision Support. *MedRxiv 2020*. [doi:10.1101/2020.11.03.20225409](https://doi.org/10.1101/2020.11.03.20225409).

Multiple modelling teams were brought together to evaluate reopening strategies for a mid-sized county in the United States.

- Lazebnik T, Bunimovich-Mendrazitsky S. The signature features of COVID-19 pandemic in a hybrid mathematical model - implications for optimal work-school lockdown policy. *MedRxiv 2020*. [doi:10.1101/2020.11.02.20224584](https://doi.org/10.1101/2020.11.02.20224584).

Presents a new hybrid model for COVID-19 dynamics using both an age-structured mathematical model and spatio-temporal model in silico, analysing the data of COVID-19 in Israel.

Other papers

Transmission

- Bi Q, Lessler J, Eckerle I, Lauer SA, Kaiser L, Vuilleumier N, et al. Household Transmission of SARS-CoV-2: Insights from a Population-based Serological Survey. *MedRxiv 2020*. [doi:10.1101/2020.11.04.20225573](https://doi.org/10.1101/2020.11.04.20225573).

Estimates the risk of SARS-CoV-2 infection from household and community exposures, and identify key risk factors for transmission and infection in a population-based serosurvey in Switzerland.

- Hoehl S, Kreutzer E, Schenk B, Westhaus S, Foppa I, Herrmann E, et al. [Longitudinal testing for respiratory and gastrointestinal shedding of SARS-CoV-2 in day care centres in Hesse, Germany. Results of the SAFE KiDS Study. MedRxiv 2020. doi:10.1101/2020.11.02.20223859.](#)
Reports a longitudinal study to screen attendees and staff from day care centres in Germany, for both respiratory and gastrointestinal shedding of SARS-CoV-2.
- Guthrie BL, Tordoff DM, Meisner J. [Summary of School Re-Opening Models and Implementation Approaches During the COVID 19 Pandemic n.d.](#)
A brief summary of the models and implementation approaches to re-opening schools, evidence related to the infection and transmission risk among school-age children, and the role of schools in driving transmission in the community.
- Kuwelker K, Zhou F, Blomberg B, Lartey S, Brokstad KA, Trieu MC, et al. [High attack rates of SARS-CoV-2 infection through household-transmission: a prospective study. MedRxiv 2020. doi:10.1101/2020.11.02.20224485.](#)
Reports a prospective case-ascertained study, collecting demographic and clinical data from index cases and household members. Sera were collected 6-8 weeks after index case symptom onset, to measure SARS-CoV-2-specific antibodies.
- Saad AA, Saad M, Boctor EM. [COVID-19 Active Surveillance Simulation Case Study - Health and Economic Impacts of Active Surveillance in a School Environment. MedRxiv 2020. doi:10.1101/2020.10.28.20221416.](#)
Explored the efficacy of an Active Surveillance testing model where a random number of students are tested daily for early detection of asymptomatic patients and for prevention of the infection among the student population.
- Public Health England [Transmission of COVID-19 in school settings and interventions to reduce the transmission: a rapid review \[Update 1\]](#)
Published 26th Sept.
Rapid review to answer the questions:
 - i) What is the transmission of COVID-19 within school settings?
 - ii) What is the effectiveness of interventions to reduce the transmission of COVID-19 within school settings?
- European Centre for Disease Prevention and Control. [COVID-19 in Children and the Role of School Settings in COVID-19 Transmission](#) Published 6th August.

Guidance

- [Keeping children safe in childcare: coronavirus | GOV.WALES n.d.](#)

Findings

The included studies can be categorised into four broad topic areas:

- a) Transmission (n=5)
- b) Mental health and wellbeing(n=5)
- c) Return to school(n=2)
- d) Healthcare use (n=1)

Transmission

Five studies examined aspects of children and young people's role in the transmission of SARS-CoV-2 met the inclusion criteria for this report; a review of international studies, and four individual studies from America, England, France and Norway.

International review

In a review of international studies, Goldstein et al¹ aimed to examine the effect of age on the transmission of SARS-CoV-2 in different settings. There was inconsistent evidence about the secondary attack rates when children contacts were compared with adult contacts. In PCR-based studies, the authors found that several studies (n=6) had observed lower attack rates in children as contacts. In contrast, there were four studies that reported similar secondary attack rates in children and adults. Likewise, serological studies (n=2) reported mixed results. Using evidence from three studies, the authors conclude that when there are limited mitigation measures in place and relatively high community prevalence of SARS-CoV-2, secondary/high schools contribute to the spread of the virus. They suggest that spread in primary schools is more limited. However, the age groups of the children and adult populations (where reported), in the included studies varied. This may have influenced the calculated secondary attack rate. The authors so not appear to taken this into account when they have reached their conclusions.

These findings should be interpreted with a significant degree of caution. This a methodologically poor paper with major flaws. For example, the method is not clearly stated and it is not possible to tell how many papers met the inclusion criteria. How/if the quality of the included studies were assessed is not reported and each is given equal weight in the findings. There are no extraction tables so it is not possible to judge the validity or reliability of the authors' conclusions.

America

To assess household transmission of SARS-CoV-2, Grijalva et al² recruited household contacts of index cases and followed them for a period of fourteen days. Daily specimens (nasal swab or nasal swab plus saliva sample) were self-collected by participants (n=191 household contacts of 101 index cases). Specimens from the first seven days were tested for SARS-CoV-2. In addition, participants were asked to complete symptom diaries.

On the day of the index case's illness onset, none of the household contacts reported symptoms. During the follow-up period, 102 (53%) had SARS-CoV-2 detected in either nasal or saliva specimens; of these 54 household contacts had SARS-CoV-2 detected on enrolment. After these contacts were excluded from analysis, the secondary infection rate was found to be 35%. 14% (n=14) of index cases were aged less than 18 years (n=5 aged <12 years, n=9 aged 12-17 years). The secondary infection rate from the younger age group was 53% and from the older age group was 38%. However, it is not clear from this report if any of the paediatric secondary cases were among the 54 secondary cases detected at enrolment. Less than half of household contacts (n=41 of 102, 40%) with confirmed SARS-CoV-2 infection reported symptoms at the time that the infection was first detected and a third (n=34 of 102, 33%) reported no symptoms during the seven days of follow-up. As there is very limited demographic information reported, it is not possible to tell how representative those taking part were of the wider population. The majority of index (74%) and secondary cases (66%) were reported to be White, non-Hispanic. There is no information about what proportion of those eligible to take part agreed to do so.

England

In a retrospective analysis of routinely collected information, Forbes et al³ investigated whether the risk of infection with SARS-CoV-2 and severe outcomes differed between adults living with and without children. Primary care records for adults over the age of 18 years were linked with hospital admissions, intensive care and mortality records.

Records from nearly 12 million adults (n=11,725,485) were included. Among adults younger than 65 years, 63% (n=5,738,498) did not live with children, 28% (n=2,568,901) lived with children aged 0-11 years and 9% (n=850,415) lived with children 12-18 years. From 1st February to 3rd August 2020, 0.33% (n=29,863) had evidence of SARS-CoV-2 recorded in their primary care record, 0.05% (n=4,776) had been admitted to hospital with COVID-19 and 0.01% (n=1,173) had died to COVID-19.

After adjusting for ethnicity, area of deprivation, BMI, smoking status and the total number of adults living in the household, living with children aged 0-11 years was not found to be associated with recorded SARS-CoV-2 infection, COVID-19 related hospital or ICU admission in adults under 65 years of age. Living with children aged 0-11 years was found to be associated with a reduced risk of death from COVID-19. However, variations by sex of the adult were found. In males, there was a small increased risk of recorded SARS-CoV-2 among those living with younger children that was not observed in females.

For adults less than 65 years of age, living with children aged 12-18 years was found to be associated with a small increased risk of recorded SARS-CoV-2 infection but not with COVID-19 related hospital or ICU admission, or death from

COVID-19. However, again there was variations by sex of the adult. There was an increased risk of COVID-9 related admission among males but not females. For adults over the age of 65 years, no associations with any of the outcomes was found. For most of the study period, schools and childcare facilities were closed for the majority of children.

France

Penot et al⁴ compared the rates of SARS-CoV-2 infection among healthcare workers and child care staff. Participants were healthcare workers (n=47) who looked after COVID-19 patients and who were also parents of children attending two hospital nurseries and also child care staff (n=44) who looked after their children in the nursery. Those taking part were asked about their history of COVID-19 symptoms, COVID-19 related contacts, swabs for nucleic acid testing, chest tomography and serology testing. Blood specimens for SARS-CoV-2 IgG testing were taken. Overall, six (12.8%) of health care worker parents and eight (18.2%) of child care staff tested positive on serology for SARS-CoV-2. The majority of those testing positive had a history of COVID-19 related symptoms or had been in contact with a colleague or relation with symptoms. It is not known, however, how representative of the wider population those taking part were. The analysis presented in this report is limited to descriptive statistics.

Norway

In a retrospective analysis of routinely collected data, Magnusson et al⁵ studied whether employees in occupations* that are, typically, in close contact with other people were at higher risk of SARS-COV-19 infection and related hospitalisation during the first and second wave of the pandemic. Data was extracted from the BEREDT C19 register in Norway which consists of electronic records from all of the hospitals, data from the Norwegian Surveillance System for Communicable Diseases, the Norwegian Population register and the Employer- and Employee-register as well as results for the first positive PCR test for SARS-CoV-2 of every resident in Norway with dates of testing and the date of any hospitalisation for COVID-19.

By October 20th, a total of 0.3% (n=12,736) of the working age (20-70 years) population had contracted COVID-19, and 953 (7.5%) of them had been hospitalised. In the first wave of the pandemic (26th February – 17th July), people employed as healthcare professionals or were taxi, bus and tram drivers had about a 1.5 to 3.5 times odds of having confirmed COVID-19 compared to the general working age population. In contrast, teachers, child care workers and a range of other occupations who typically come in contact with others in the course of their employment had no increased risk or had a reduced risk of confirmed COVID-19 when compared to the general working population. During

* Health professions, education and teaching, trade, catering, travel, tourism and recreation industries

the second wave (18th July - 20th October), bar tenders, waiters, food service counter assistants, travel stewards and taxi drivers had a 1.5-4 times odds of having confirmed COVID-19 compared to the working age population. Again, teachers, childcare workers and a range of other occupations were not at greater odds of confirmed COVID-19 than the general working age population. Once infected with COVID-19, with the exception of dentists, none of the occupations included in this study had a considerably higher risk of being hospitalised compared to general working age population that had been infected. Pre-school teachers and child care workers along with taxi, bus and tram drivers had about a 1-2 times increased odds. However, this finding should be interpreted with a degree of caution as, overall, there was a small number of hospitalisations with several occupations without any hospitalisations.

In this analysis, it was not possible to differentiate between people who were in full- or part-time employment. The socio-economic circumstances of people in the occupational groups may have been an influencing factor. Community prevalence of SARS-CoV-2 was relatively low during the study period. In addition, testing for SARS-CoV-2 was limited to priority groups including health professionals at the beginning of wave 1. It is possible, as the pandemic progresses, the pattern of occupational risk may change.

¹ Goldstein E, Lipsitch M, Cevik M. [On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community](https://doi.org/10.1093/infdis/jiaa691). J Infect Dis 2020. [doi:10.1093/infdis/jiaa691](https://doi.org/10.1093/infdis/jiaa691).

² Grijalva CG, Rolfes MA, Zhu Y, McLean HQ, Hanson KE, Belongia EA, et al. Transmission of SARS-COV-2 Infections in Households — Tennessee and Wisconsin, April–September 2020. MMWR Morb Mortal Wkly Rep 2020;69. [doi:10.15585/mmwr.mm6944e1](https://doi.org/10.15585/mmwr.mm6944e1).

³ Forbes H, Morton CE, Bacon S, McDonald HI, Minassian C, Brown J, et al. [Association between living with children and outcomes from COVID-19: an OpenSAFELY cohort study of 12 million adults in England](https://doi.org/10.1101/2020.11.01.20222315). MedRxiv 2020. [doi:10.1101/2020.11.01.20222315](https://doi.org/10.1101/2020.11.01.20222315).

⁴ Penot P, Delaval A, L'Hour F, Grenier A, Harich R. Retrospective assessment of SARS-COV2 circulation in two hospital nurseries hosting healthcare workers' children during lockdown in one of the most affected French area s. MedRxiv 2020. [doi:10.1101/2020.10.28.20191981](https://doi.org/10.1101/2020.10.28.20191981).

⁵ Magnusson K, Nygard KM, Vold L, Telle KE. Occupational risk of COVID-19 in the 1st vs 2nd wave of infection. MedRxiv 2020. [doi:10.1101/2020.10.29.20220426](https://doi.org/10.1101/2020.10.29.20220426).

Mental health and wellbeing

Five studies that examined aspects of children and young people's mental health and wellbeing met the inclusion criteria for this report. The research had been carried out in America, Italy (n=2), The Netherlands and Spain. These studies contribute to emerging evidence that children and young people's mental health and wellbeing has been adversely affected by the pandemic and the necessary public health control measures. However, most rely on cross-sectional designs with recruitment processes that introduce a source of bias. Often, it is not possible to tell how representative the participants are of a general population.

Thus, the findings in the following section should be interpreted with a degree of caution.

America

In a longitudinal mixed-methods study, Rogers et al⁶ examined how COVID-19 had affected adolescents' (aged 14-17 years) relationships and mood. Participants had been recruited through a third-party research company to take part in a longitudinal study about adolescent development. Adolescents taking part had completed three validated questionnaires* in October 2019 (pre-pandemic). In April 2020, the participants were asked to complete the questionnaires again. In addition, they were asked a series of open-ended questions to capture their experiences of the pandemic and the social restrictions as well as perceived changes in their relationships and mood.

On average, pre-pandemic, the adolescents who completed the questionnaire at both time points (n=407, response rate = 67%) reported low levels of mental health problems. Between October 2019 and April 2020, small but statistically significant increases in depressive and anxiety symptoms and loneliness were detected. The majority of participants reported increases in negative affect and decreases in positive affect during COVID-19. Those from lower income households perceived greater increases in negative affect and more pronounced decreases in positive affect. They also reported greater conflict with their parents and less support from their friends. Reported challenges of the pandemic included less in-person interaction, not being about to get out of the house, having too much family time, fear and anxiety related to the virus, and stress related to the shift to online school learning. While many of the participants felt there had been no positives, some reported that being able to spend more time with their family or having more personal time had been enjoyable.

Italy

The first Italian study used an online survey to investigate if parenting self-efficacy and regulatory emotional self-efficacy related to COVID-19 mediated the relationship between parents' psychological distress and children' emotional regulation.⁷ Parents of children aged 6-13 years were recruited through social media to answer a mix of bespoke questions and validated measures.[†]

Complete information was received from 244 parents. It was found that parents who reported higher levels of psychological distress were more likely to have a lower socio-economic status, had seen their working situation worsen during the pandemic and were lone parents. Parents' psychological distress impacted on their child's emotional regulation mediated by their parenting self-efficacy and

* Children's Depression Inventory short version, Generalised Anxiety Scale (7-item) and Loneliness Scale (3-item)

† The Perceived Stress Scale, The Regulatory Emotional Self-efficacy Scale, Parenting Self-Agency Scale and the Emotion Regulation Checklist (short form) about their child.

their own regulatory emotional self-efficacy. However, the majority of parents (92.1%, n=255) had a middle to high socio-economic status and 70% (n=195) had not been affected economically by the pandemic. In addition, there was a reliance on parents' perceptions of their child's wellbeing.

The second Italian report presents the baseline data collected in early April 2020 from an on-going longitudinal study about family wellbeing during the COVID-19 pandemic.⁸ Parents of children aged 2-14 years were recruited through social media to take part. Participants (n=810) were asked to complete a mix of bespoke and validated measures.* Parents were considered to be at socio-economic risk if they reported that they had lost their job due to the pandemic, their total family income less than 1250 € per month, or their education level was lower than high school. It was found that the level of household chaos affected parenting stress. Parents living in more chaotic households reported higher levels of parenting stress, which in turn, was associated with lower emotional regulation in children. Parental involvement mediated this relationship, with a protective role evident in the group of parents who were considered to be at socio-economic risk.

The Netherlands

Luijten et al⁹ examined the impact of lockdown during the pandemic on the mental health of Dutch children and young people (8-18 years). Participants were recruited from a panel survey database through an online research agency. Questions about global health, peer relationship, anxiety, depressive symptoms, anger and sleep-related impairment from the Patient-Reported Outcomes Measurement Information System (PROMIS) were asked. In addition, parents were asked if there had been a negative change in their work situation, if a friend or relative had been infected with COVID-19 and if their child was still attending school during the lockdown. Children were asked if the atmosphere at home had changed and the impact of the lockdown on their daily life. Information from the PROMIS domains was compared to data collected from a nationally representative sample of children and young people pre-pandemic (n=2401, December 2017-July 2018).

Across all of the PROMIS domains, participants (n=844) reported scores that were lower compared to children and young people pre-pandemic after controlling for their age, parental country of birth, parental educational level and the number of children in the household. The largest differences were found for anxiety and depressive symptoms. Significantly, more children reported severe anxiety and sleep-related impairment during the pandemic than previously.

* subscale Parent-Child Dysfunctional interaction domain of the Parenting Stress Index Short Form, Family involvement subscale of the Parent Report Form CHIP-Child Edition, The CHAOS-Chaos, Hubbub, and Order Scale (shortened version) and the Emotion Regulation Checklist about their child.

Increased anxiety was found to be associated with age, being in a single-parent family, having an infected relative or friend and parents with a negative change in work. Similarly, more sleep-related impairment was associated with being in a single-parent family and having parents with a negative change in work.

Children and young people reported a worse atmosphere at home during the COVID-19 lockdown compared to previously. The majority ($\approx 90\%$) reported that the COVID-19 lockdown had had a negative impact on their life. Issues that were mentioned most frequently included missing contact with friends, not being allowed to go to school and missing their freedom. However, a minority reported that they had experienced no difficulties or had experienced positive consequences.

Spain

Families taking part in a research project, in two schools, about the promotion of emotional skills were invited to take part in an additional study to look at the changes to children's psychological wellbeing (aged 3-11 years) associated with lockdown.¹⁰ Participants were asked to complete the attentional problems, depression, challenging behaviours, emotional regulation, hyperactivity and willingness to study (for children in primary education) dimensions of the System of Evaluation of Children and Adolescents (SENA) questionnaire. In addition, there was an open-ended question to let families to comment on anything not covered by the questionnaire. Baseline for the original study had been completed in February 2020.

Information from both data collection points was received from 113 families ($n=75$ primary school, $n=38$ early childhood education). For young children in early childhood education (3-6 years), there was little change in the means scores across all the dimensions from baseline to April 2020, whereas primary school-aged children (6-11 years) scored higher in emotional regulation and attentional difficulties as well as hyperactivity and impulsivity. There were no changes found in the depression or challenging behaviour scores. 62% ($n=70$) of participants answered the open-ended question. The majority reported that their child's wellbeing had been adversely affected by the pandemic. Greater difficulties in emotional regulation as well as sleeping and eating patterns were described. However, some parents reported positive experiences such as improvement in their child's mood and the greater availability of family time. However, the public schools involved in the original study were in middle/upper class neighbourhood, so the participants' experiences may not have been typical of the wider population.

⁶ Rogers AA, Ha T, Ockey S. Adolescents' Perceived Socio-Emotional Impact of COVID-19 and Implications for Mental Health: Results from a U.S.-Based Mixed-Methods Study. *J Adolesc Health* 2020. [doi:10.1016/j.jadohealth.2020.09.039](https://doi.org/10.1016/j.jadohealth.2020.09.039).

⁷ Morelli M, Cattelino E, Baiocco R, Trumello C, Babore A, Candelori C, et al. Parents and Children During the COVID-19 Lockdown: The Influence of Parenting Distress and Parenting Self-Efficacy on Children's Emotional Well-Being. *Front Psychol* 2020;11:584645. [doi:10.3389/fpsyg.2020.584645](https://doi.org/10.3389/fpsyg.2020.584645).

⁸ Spinelli M, Lionetti F, Setti A, Fasolo M. Parenting Stress During the COVID-19 Outbreak: Socioeconomic and Environmental Risk Factors and Implications for Children Emotion Regulation. *Fam Process* 2020. [doi:10.1111/famp.12601](https://doi.org/10.1111/famp.12601).

⁹ Luijten MAJ, van Muilekom MM, Teela L, van Oers HA, Terwee CB, Zijlmans J, et al. The impact of lockdown during the COVID-19 pandemic on mental and social health of children and adolescents. *MedRxiv* 2020. [doi:10.1101/2020.11.02.20224667](https://doi.org/10.1101/2020.11.02.20224667).

¹⁰ Giménez-Dasí M, Quintanilla L, Lucas-Molina B, Sarmiento-Henrique R. Six weeks of confinement: psychological effects on a sample of children in early childhood and primary education. *Front Psychol* 2020;11:590463. [doi:10.3389/fpsyg.2020.590463](https://doi.org/10.3389/fpsyg.2020.590463).

Return to school

Two papers that reported aspects of children or caregivers perspectives about returning to the school. One survey in England asked children about their feelings several weeks after they returned to school. The other study asked caregivers in Texas about their thoughts about their favoured format of learning for the new school year 2020-21.

England

The Children's Commissioner for England commissioned a survey of children and young people (8-17 years) about how they had found going back to school.¹¹ Carried out at the beginning of October, children (n=1500) were given several statements about being back at school and asked to say if they agreed or disagreed. Overall, 71% of children agreed with the statement that they were excited to be back at school. This was highest among primary school pupils with 80% agreeing that they were excited compared to 65% of secondary school pupils. 71% of children agreed with the statement 'I feel safe at school'. Again, there were differences between primary and secondary school pupils with 78% of primary school pupils agreeing compared to 66% of secondary school pupils. The majority of children (66%) agreed that they had everything they needed to learn from home effectively. However, children who had a unemployed parent were less likely to agree (52%).

Overall, 68% of children agreed that their mental health was going well. However, 14% (about 1 in 7) felt that their mental health was not going well. This increased to 16% of girls, significantly more than boys (12%). Children in lone parent households were statistically significantly less likely, than those in two parent/carer households, to feel that school was going well or that their relationships with friends, family or teachers were going well.

America

Care-givers of children and young people (aged 4-18 years) enrolled in school in a public school district in Texas were surveyed in July 2020 to find out their preference for in-person, remote or blended learning for the forthcoming school year.¹² Responses were received from 4436 caregivers (53% response rate). Overall, 800 (18%) stated a preference for full-time remote learning, 52% (n=2306) wanted in-person learning and 30% (n=1330) stated a preference for a blend approach. Care-givers of older pupils (12-17 years) were more likely to state a preference for a blended learning approach and less likely to state a preference for in-person learning compared to care-givers of younger children (4-9 years). Concerns about the child's health and safety was the factor most strongly associated with care-giver preference for remote versus in-person learning.

¹¹ Children's Commissioner for England. [Some sort of normal. What children want from schools now](#)

¹² Limbers CA. Factors Associated with Caregiver Preferences for Children's Return to School during the COVID-19 Pandemic. [J Sch Health n.d.](#)

Healthcare use

Kuitunen et al¹³ examined the effects of school and day care closure on paediatric hospital visits in Finland. Information about paediatric primary and secondary emergency care visits from 1st January to 30th September 2020 was extracted from patient discharge records of a single hospital. This information was compared with the same time period in 2019. The weekly median number of emergency department visits was significantly lower (122, IQR 45) in 2020 compared to 2019 (139, IQR 30). The proportion of children who needed hospitalisation in 2020 (n=275, 6% of total emergency visits) also fell compared to 2019 (n=435, 8% of total emergency visits). There is, however, information missing from this brief report. There are no data table presented so it is not possible to judge the reliability of the authors' interpretation. It is not possible to tell if the catchment area of the hospital was representative of the wider population.

¹³ Kuitunen I, Haapanen M, Artama M, Renko M. Closing Finnish schools and day care centres had a greater impact on primary care than secondary care emergency department visits. *Acta Paediatr* 2020. [doi:10.1111/apa.15646](https://doi.org/10.1111/apa.15646).

APPENDIX 1: Method*

Search terms

- #1. coronavirus or corona virus or ncov* or covid* or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19
- #2. Child* or adolescen* or teen* or young person or young people or pupil*
- #3. Early years or childcare or nurser* or preschool* or pre-school* or kindergarten* or daycare or day care or school* or educational establishment* or "place of education" or special educational needs or (education* AND setting*) or teacher
- #4. #2 OR #3
- #5. #1 AND #4

Sources[†]

- Medline
- Embase
- LitCovid
- MedRxiv
- Proquest Coronavirus Research Database
- Proquest databases (Public Health, ASSIA, Sociological Abstracts)
- Don't forget the Bubbles
- Covid-19 Evidence Reviews (VA Syntheses Program)
- WHO Global literature on coronavirus disease – now incorporating CDC Covid-19 Research Articles Database
- UNICEF website
- UNICEF Children & COVID-19 Research Library
- Oxford COVID-19 Evidence Service
- RCPCH COVID-19 Research Evidence Summaries
- Evidence Aid
- HIQA Ireland Evidence Summaries
- HIQA Ireland Database of Public Health Guidance on COVID-19
- Scottish Government publications
- PHE COVID-19 Literature Digest
- CDC Morbidity & Mortality Weekly Report
- Google Advanced Search

* With thanks to Seona Hamilton, Public Health Librarian, Public Health Scotland

[†] The sources were updated from 23rd October to reflect changes in the online databases.

Inclusion criteria

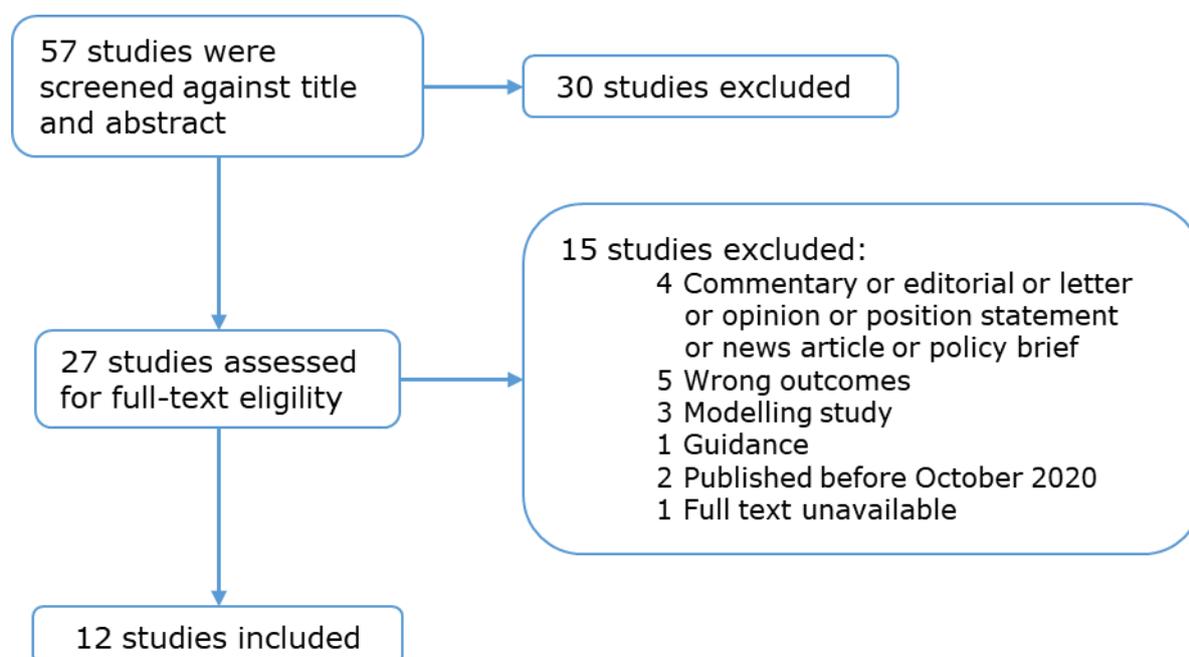
- Studies undertaken in Europe, North America, New Zealand or Australia
- Studies that report outcomes related to children and young people up to age 18 years living in community settings
- Studies that report transmission of COVID-19 in settings relevant to early learning and childcare, primary or secondary level schools
- Published in English
- Published or updated 30th October – 6th November

Exclusion criteria

- Studies relating to further or higher education settings
- Papers that report modelling studies
- Studies that examine the clinical manifestations, diagnosis or treatment of Covid-19 in a paediatric population
- Articles which are commentaries, editorials, position statements, letters, news articles or opinion pieces
- Guidelines for schools or 'hints and tips' for teachers
- Study protocols

Selection process

The titles and abstracts were screened for potential inclusion using the agreed inclusion/exclusion criteria. The full text of each potential paper was then assessed for inclusion. The progress of the papers through the selection process is summarised in the diagram below.



Appendix 2: Included studies

Transmission

CHARACTERISTIC	SUMMARY
Reference	Forbes H, Morton CE, Bacon S, McDonald HI, Minassian C, Brown J, et al. Association between living with children and outcomes from COVID-19: an OpenSAFELY cohort study of 12 million adults in England. MedRxiv 2020. doi:10.1101/2020.11.01.20222315.
Aims	To investigate whether risk of infection with SARS-CoV-2 and severe outcomes differed between adults living with and without children.
Study design/setting	Population-based cohort study; retrospective analysis of routinely collected data; 1 st February-3 rd August.
Population	General population
Country	England
Method	<p>Data: Primary care records managed by the GP software provider The Phoenix Partnership (TPP) were linked to Secondary Uses Service (SUS) hospital admissions, Intensive Care National Audit & Research Centre (ICNARC) COVID-19-related Intensive Care Unit (ICU) admissions and Office for National Statistics (ONS) mortality records through OpenSAFELY, a data analytics platform created on behalf of NHS England.</p> <p>The study population included all adults aged >18 years, registered and active for ≥ three months, in an English TPP general practice on 1st February 2020 (study start). Participants were followed until the earliest of: developing the outcome of interest; deregistration from their general practice; death from any cause; or 3rd August 2020 which was the latest date of linked outcomes, except for hospital admissions which were available until 1st May 2020.</p>

	<p>The TPP-developed pseudonymised household identifier links people living at the same address. People with no household identifier, and individuals living in care homes, household sizes >10 individuals (possible care homes or other institutions) and households where any individual had a missing record of sex, age, or index of multiple deprivation (IMD), and individuals with missing ethnicity were excluded.</p> <p>Outcomes:</p> <ol style="list-style-type: none"> 1) evidence of SARS-CoV-2 infection recorded in primary care defined as a code indicating either a clinical diagnosis of COVID-19, a positive swab test for SARS-CoV-2, or having sequelae of COVID-19 2) hospital admission for COVID-19 defined as a COVID-19 ICD-10 code in the primary diagnosis field 3) ICU admission with COVID-19 that required non-invasive or invasive respiratory support 4) COVID-19 related death defined as a COVID-19 ICD-10 code anywhere on the death certificate <p>Analysis: multivariable Cox regression, to calculate fully-adjusted hazard ratios (HR) of outcomes from 1st February-3rd August 2020 comparing adults living with and without children in the household.</p>
Results	<p>The final cohort included 9,157,814 adults ≤ 65 years and 2,567,671 >65 years. Among those ≤65 years, 5,738,498 (63%) did not live with children, 2,568,901 (28%) lived with children 0 to 11 years and 9% (850,415) lived with children 12 to 18 years.</p> <p>A total of 29,863 (0.33%) had evidence of SARS-CoV-2 infection recorded in their primary care record, 4,776 (0.05%) were admitted to hospital with COVID-19, 1,471 (0.02%) were admitted to ICU for ventilatory support with COVID-19 and 1,173 (0.01%) died of COVID-19.</p> <p>Those living with children were more likely to be younger, female, of non-white ethnicity, have a lower IMD, have more adults in the household and have fewer comorbidities.</p> <p>Among adults ≤65 years, after adjusting for ethnicity, IMD, BMI, smoking and total number of adults in the household, living with children aged 0 to 11 years was not associated with recorded SARS-CoV-2 infection, COVID-19 related hospital or ICU</p>

	<p>admission but was associated with a reduced risk of death from COVID-19 (HR 0.74, 95%CI 0.60-0.90).</p> <p>Living with children aged 12 to 18 years was associated with a small increased risk of recorded SARS-CoV-2 infection (HR 1.08, 95%CI 1.03-1.13), but was not associated with COVID-19 related hospital or ICU admission, or death from COVID-19.</p> <p>For adults >65 years living in a household with children, there was no evidence of an association with any outcome. Living with children of any age was associated with around 30% reduced risk of death from non-COVID- 19 causes for adults ≤65 but there was no reduction in risk for adults >65 years. In all analyses, additionally adjusting for comorbidities did not materially change the results.</p> <p>There were no evident trends in the associations between risks of recorded SARS-CoV-2 in primary care or severe outcomes from COVID-19 and the number of children aged 0 to 11 years in a household, for adults of any age.</p> <p>Among ≤65 year olds, there was some evidence that the associations varied by sex of the adult: for recorded SARS-CoV-2 infection (P-value for interaction=<0.001), the small increased risk among those living with children aged 0 to 11 years was observed in males (HR 1.09, 95% CI 1.04-1.13) but not females (HR 0.99, 95%CI 0.96-1.03).</p> <p>For COVID-19-related hospital admission (P int=<0.001), there was evidence of an increased risk of admission among males living with children aged 12 to 18 years (HR 1.24, 95%CI 1.10-1.40), but not females (HR 0.88, 95% CI 0.76-1.03).</p> <p>For death from COVID-19 there was evidence of a reduced risk in females (HR 0.58, 95%CI 0.41-0.82) for females living with children 0 to 11 years (P int=0.059); HR 0.57, 95% CI 0.36-0.89 (P int=0.029) for those living with children 12 to 18 years), but no evidence of lower risk for males living with children.</p> <p>There was evidence that for working-age adults, the risk of recorded SARS-CoV-2 infection was higher in the period three weeks after school closures compared to earlier.</p>
Comments	<p>Occupation not measured, potential for increased contact in teachers, childcare workers. For most of the study period, schools and childcare were closed. It is possible that findings</p>

	may be different after social restrictions were lifted and in changes in community prevalence.
CHARACTERISTIC	SUMMARY
Reference	Goldstein E, Lipsitch M, Cevik M. On the effect of age on the transmission of SARS-CoV-2 in households, schools and the community. J Infect Dis 2020. doi:10.1093/infdis/jiaa691.
Aims	To examine the effect of age on the transmission of SARS-CoV-2 infection in different settings
Study design	Literature review
Search strategy	<p>Databases: Living Evidence on COVID-19 database which COVID-19 related COVID-19 related published articles from Pubmed and EMBASE and preprints from medRxiv and bioRxiv.</p> <p>Search terms:</p> <ul style="list-style-type: none"> a) ((children) OR (age) OR (aged) OR (years old) OR (secondary)) AND ((household) OR (households) OR (contacts)) in the Title/Abstract, published before October 5, 2020. b) (seroprevalence) OR (((antibody) OR (serological)) AND (survey)) in the Abstract/Title c) all studies related to school outbreaks in the Living Evidence on COVID-19 database (search terms not stated) <p><i>NB: these search terms are presented in separate section of this paper so it is likely they were carried out separately rather than an inclusive search</i></p>
Inclusion criteria	Studies were eligible for inclusion if they reported the estimates of either secondary attack rate, susceptibility to, or odds ratio for infection in different age groups, and where the setting for the contact (e.g. household or other), either was the same for all contacts, or

	was adjusted for (as a covariate in a model) in those estimates. <i>NB: this is the stated inclusion criteria for the first category of search terms. It is not clear whether these were the same for the other search terms.</i>
Exclusion criteria	No stated
Countries	Not clear
Method	Not stated
Results	<p>14 studies met the authors' inclusion criteria for the first search term category. Otherwise included studies are not stated.</p> <p><u>PCR-based studies of SARS-CoV-2 infection in close contacts:</u> Several studies found much lower secondary attack rates (measured by PCR-positive cases among contacts) in children as contacts – using different age cut-offs of children up to age 20y -- compared to adults. In a hospital-based study near Wuhan, China, the OR (odds ratio) for infection in contacts aged < 18y relative to adults was 0.18 (95% CI 0.06, 0.54). In Guangzhou, China study, the multivariable OR for infection in contacts aged under 20y vs. contacts aged over 60y was OR=0.23(0.11,0.46)), while for contacts aged 20-59y vs. contacts aged over 60y it was OR=0.64 (0.43,0.97). For household contacts of confirmed cases in Zhuhai, China, the OR for infection in children aged 4-18y relative to persons aged 19-60y was 0.09 (0.01-0.73). In a Chinese study of close contacts, the multivariable OR for infection in children aged < 15y compared to adults aged 15-64y was 0.34 (0.24 to 0.49). In a Hunan, China study the multivariable odds ratio for infection in contacts aged under 15y vs. contacts aged 15-64y was 0.58 (0.34, 0.98). A study modelling transmission within household in Israel found that susceptibility in children under the age of 20y was 0.45(0.40, 0.55) that of adults. For a study of household contacts in New York State, the OR for infection in children aged < 18y relative to adults aged 18-29y was 0.41 (0.17,0.99).</p> <p>A few studies showed similar SAR (secondary attack rate) in children or adults. For a study of household contacts in Wisconsin and Utah, the OR for infection in children aged <18y relative to adults aged 18-49y was 0.88 (0.37,2.02). For the study in Shenzhen, China, infection rates in close contacts were similar across age groups. However, 298/391 of index cases in this study were travellers, with joint travel being associated with an odds</p>

	<p>ratio of 7.1 (1.4,34.9) for infection in close contacts, suggesting the possibility of acquisition of infection at the source of travel and making the interpretation of the estimates in difficult. For a multivariable analysis involving contacts of COVID-19 cases in Guangzhou, China, the odds ratio for infection in contacts aged <18y relative to contacts aged 18-44y was 0.78 (0.41,1.50). For household contacts of COVID-19 cases in two Indian states, OR for infection in children aged <18y relative to adults aged 18-34y was 0.96(0.71,1.29). For a study of family members of SARS-CoV-2 cases in Greece [19], OR for infection in paediatric contacts vs. adult contacts was 1.69(0.7,4.2).</p> <p><u>Serological studies of SARS-CoV-2 infection in close contacts:</u> For a study of household contacts of hospitalized cases in Italy, the OR for infection in children aged <18y relative to adults was 0.77(0.27,2.17). For a study of household contacts in Utah and Wisconsin, USA, the OR for infection in children aged <18y relative to adults was 1.39(0.55,3.53).</p> <p><u>School outbreaks:</u> There is some evidence, particularly from the Spring 2020 that given no or limited mitigation measures (that is, for example, limited testing and quarantine of infected individuals and their contacts in schools, no reduction in class sizes, and limited mask use), robust spread of SARS-CoV-2 can occur in secondary/high schools. A cluster investigation linked to a high school in a town in northern France found high rates of seroprevalence for anti-SARS-CoV-2 antibodies among high school students. While even higher seroprevalence among the school staff was found following an outbreak in that school, much lower seroprevalence was identified among parents and siblings of pupils, suggesting that the school was likely the source of transmission. An outbreak investigation in a regional public school in Jerusalem, Israel found high rates of PCR-detected SARS-CoV-2 infection in both the staff and students in grades 7-9 -- but not grades 10-12, suggesting that in-school, rather than just community transmission contributed to the rates of infection in students in grades 7-9. A serological study in Santiago, Chile following an outbreak that led to a school closure found high rates of anti-SARS-CoV-2 antibody seroprevalence among pre-school through secondary school students, with even higher seroprevalence rates among the staff.</p>
Comments	Methodologically weak with major flaws. The method is not stated. It seems that several searches were done. It is not possible to tell how many papers met the inclusion criteria throughout. There is a brief description of each study but with little or no synthesis. There

	are no data tables so it is not possible to judge the reliability of the authors' interpretation. The relative quality of the studies has not been taken into account. The age group of the adult population varied and in many cases is not stated. Younger adult age groups may be more or less susceptible to infection.
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CHARACTERISTIC	SUMMARY
Reference	Grijalva CG, Rolfes MA, Zhu Y, McLean HQ, Hanson KE, Belongia EA, et al. Transmission of SARS-COV-2 Infections in Households – Tennessee and Wisconsin, April–September 2020. MMWR Morb Mortal Wkly Rep 2020;69. doi:10.15585/mmwr.mm6944e1.
Aims	To assess household transmission of SARS-CoV-2
Study design/setting	A case-ascertained study, Nashville, Tennessee, and Marshfield, Wisconsin, commencing in April 2020.
Population	General population
Country	US
Method	<p>Index cases were defined as the first household members with COVID-19-compatible symptoms who received a positive SARS-CoV-2 RT-PCR test result, and who lived with at least one other household member.</p> <p>Households were eligible if the index case had symptom onset < 7days before household enrolment and the household included at least one other person who was not symptomatic at the time of the index patient's illness onset and was thus deemed to be at risk</p> <p>After enrolment, index case and household members were trained remotely to complete symptom diaries and obtain self-collected specimens, nasal swabs only or nasal swabs and saliva samples, daily for 14 days. Specimens from the first 7 days were tested for SARS-CoV-2 using CDC RT-PCR protocols.</p>

	<p>The 7-day secondary infection rate was calculated by dividing the number of laboratory-confirmed SARS-CoV-2 infections identified during the 7-day follow-up period by the number of household members at risk per 100 population.</p> <p>To account for household members possibly having been infected when the index case became ill, secondary infections rates were also calculated excluding household members who had positive test results at enrolment.</p>
Results	<p>A total of 191 enrolled household contacts of 101 index patients reported having no symptoms on the day of the associated index patient's illness onset, and among these 191 contacts, 102 had SARS-CoV-2 detected in either nasal or saliva specimens during follow-up, for a secondary infection rate of 53% (95% confidence interval [CI] = 46%–60%). Excluding 54 household members who had SARS-CoV-2 detected in specimens taken at enrolment, the secondary infection rate was 35% (95% CI = 28%–43%). 75% of infections identified within 5 days of the index case's illness onset.</p> <p>14 (14%) index cases were aged <18 years including 5 aged <12 years and 9 aged 12-17 years. The secondary infection rate from index cases aged <12 years was 53% (95% CI = 31%–74%) and from index cases aged 12–17 years was 38% (95% CI = 23%–56%).</p> <p>Forty percent (41 of 102) of infected household members reported symptoms at the time SARS-CoV-2 was first detected by RT-PCR. During 7 days of follow-up, 67% (68 of 102) of infected household members reported symptoms.</p>
Comments	<p>It is not known how representative of the wider population those taking part were. There is no information about what proportion of those eligible to take part agreed to do so.</p>

CHARACTERISTIC	SUMMARY
Reference	<p>Penot P, Delaval A, L'Hour F, Grenier A, Harich R. Retrospective assessment of SARS-COV2 circulation in two hospital nurseries hosting healthcare workers' children during lockdown in one of the most affected French area s. MedRxiv 2020. doi:10.1101/2020.10.28.20191981.</p>

Aims	To compare rates of SARS-CoV-2 infection among healthcare workers and child care professionals working in 2 hospital nurseries during lockdown
Study design/setting	Retrospective cohort study; 29 th May – 2 nd July
Population	Parents who were health care workers with children (6wks-3yrs) attending 2 hospital childcare centres and the childcare workers in the centres
Country	France
Method	<p>Eligible parents were healthcare workers who were caring for COVID patients (n=47) and their child(ren) had attended the hospital nursery on at least 2 days between 17th March and 11th May. Eligible nursery staff (n=44) had been directly in charge of health workers' children for at least two days during the same period.</p> <p>A face-to-face survey was conducted to find out details on history of symptoms, contacts, swab for nucleic acid testing, chest tomography. Serological testing (SARS-COV2 IgG) was carried out. Any participant with a positive serology at the time of blood sampling was considered as a confirmed SARS-COV2 infection. The infection attack rate (IAR) was defined as the proportion of all participants with confirmed SARS COV-2 infection.</p>
Results	<p>12.8% (n=6) of health care parents tested positive on serology. 18.2% (n=8) of nursery staff tested positive. 5/8 child care worker cases were associated with an outbreak in one nursery.</p> <p>In the first nursery, five childcare workers and three parents tested positive. In the second nursery, three childhood professionals and three parents from COVID units had positive serology tests. The majority of those testing positive had either experienced COVID-related symptoms or had been in contact with someone with COVID-related symptoms.</p> <p>The IAR for healthcare workers was consistent with the global IAR among Montreuil's (14.8 %) and Aulnay-sous-Bois' (13%) hospital staff measured on June 25.</p>

Comments	It is not known how representative of the wider population the childcare centres were. Descriptive analysis only. It is not known if there any difference based on the number of days children had attended the child care centre.
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CHARACTERISTIC	SUMMARY
Reference	Magnusson K, Nygard KM, Vold L, Telle KE. Occupational risk of COVID-19 in the 1st vs 2nd wave of infection. MedRxiv 2020. doi:10.1101/2020.10.29.20220426.
Aims	To study whether employees in occupations that typically have close contact with other people are at higher risk of SARS-CoV-2 infection (COVID-19) and related hospitalization, for the 1st and 2nd wave of infection in Norway.
Study design/setting	Retrospective analysis of routine collected data
Population	All living working age (20-70 years) Norwegian residents
Country	Norway
Method	<p>Individual-level data from the BEREDT C19 register was extracted. The register consists of electronic patient records from all hospitals in Norway (NPR), data from the Norwegian Surveillance System for Communicable Diseases (MSIS), The Norwegian Population Registry and the Employer- and Employee-register, which are merged on the unique personal identification number that is provided every Norwegian resident at birth or upon immigration.</p> <p>BEREDT C19 includes results for the first positive polymerase chain reaction (PCR) tests for SARS-CoV-2 of every resident in Norway with dates of testing and diagnosis.</p> <p>The register also includes date of any hospitalization for COVID-19.</p> <p>Occupation is reported in the Employer-Employee register with codes as described at Statistics Norway for all residents in Norway. Occupation was registered with a 7-digit code in the Employer- and Employee-register according to the Standard Classification of</p>

	<p>Occupation (STYRK-98). To allow for international comparisons, this was converted to make the classification align with the Standard Classification of Occupations (ISCO-08).</p> <p>Occupations with number of employees ≥ 1000 and number of contracted weekly work hours ≥ 1 for a reference week at the beginning of the pandemic (week 10) that, typically, had close contact with other people were included. Health, teaching, trade, catering, tourism & travel and recreation & beauty occupations were included.</p> <p>Two outcomes: 1) COVID-19, which was defined as either having a confirmed positive polymerase chain reaction (PCR) test for COVID-19, and/or by having ICD-10 diagnostic code U07.1 of confirmed COVID-19, and, 2) Hospitalization with confirmed COVID-19 (≥ 24 hours). Test criteria for COVID-19 initially included having severe disease, being in a risk group or being health personnel, later changing to include everyone with symptoms or having been in contact with persons with confirmed COVID-19.</p> <p>Outcomes for two periods, before and after July 18th 2020 were compared. At this date, the number of newly infected daily cases in Norway had decreased to ~ 0, and had been stable and low for several weeks in July before slowly rising again in the beginning of August - 1st wave (including February 26th – July 17th 2020) and the 2nd wave (including July 18th – October 20th 2020).</p> <p>Analysis: crude association between the exposure occupation group and outcome COVID-19 (yes/no) using logistic regression for each of the waves was assessed. Then, age, sex and country of birth was adjusted for in a multivariate logistic regression model.</p>
Results	<p>On 1st Jan. 2020, 3 553 407 persons aged 20-70 years were living in Norway. (24.4%) were non-employed or not registered with any occupation. By October 20th 2020, a total of 12 736 (0.3%) of working age adults had contracted COVID-19, of which 953 (7.5%) were hospitalized with severe COVID-19 disease. Overall, in wave 1, 2.3 per 1000 of working age, in wave 2, 1.7 per 1000.</p> <p>Persons employed as nurses, physicians, dentists, physiotherapists, bus, tram and taxi drivers had ~ 1.5-3.5 times the odds of confirmed COVID-19 during the first wave of infection when compared to everyone in their working age. In contrast, teachers of children and students at any age, child care workers, as well as bartenders, waiters, sales shop assistants, cleaners, fitness instructors, hair dressers, hotel receptionists, travel</p>

	<p>guides and transport conductors had no increased risk, or even a reduced risk of confirmed COVID-19 when compared to everyone in their working age.</p> <p>The pattern of occupational risk of confirmed COVID-19 was different for the 2nd wave of infection than for the 1st wave of infection. In the 2nd wave of infection, bartenders, waiters, food service counter attendants, travel stewards and taxi drivers had ~1.5-4 times the odds of COVID-19 when compared to everyone in their working age. A range of occupations had no increased odds (OR~1): child care workers, teachers of children and students at any age, fitness instructors, sales shop assistants, hair dressers, bus and tram drivers, hotel receptionists, cleaners and health personnel (nurses, physicians, physiotherapists and dentists) when compared to everyone in their working age.</p> <p>None of the included occupations had any particularly increased risk of severe COVID-19, indicated by hospitalization, when compared with all infected in their working age, apart from dentists, who had a ~7 (2-18) times increased odds ratio, and pre-school teachers, child care workers and taxi, bus and tram drivers who had a ~1-2 times increased odds ratio. However, for several occupations, no hospitalizations were observed, confidence intervals were wide and all analyses should be interpreted with care due to the small number of COVID-19 hospitalizations.</p>
Comments	<p>It was not possible in this analysis to differentiate between people in full or part-time employment. Also, the socio-economic circumstances of people in the occupational groups may have been an influencing factor. The community prevalence in wave 2 was relatively low. It is possible that, as the pandemic progresses, the pattern of occupational risk may change.</p>

Mental and wellbeing

CHARACTERISTIC	SUMMARY
Reference	Giménez-Dasí M, Quintanilla L, Lucas-Molina B, Sarmento-Henrique R. Six weeks of confinement: psychological effects on a sample of children in early childhood and primary education. Front Psychol 2020;11:590463. doi:10.3389/fpsyg.2020.590463.
Aims	To evaluate the changes to children's psychological wellbeing associated with the lockdown in Madrid (11 th March – 25 th April)
Study design/setting	Longitudinal; Baseline completed in Feb. 2020, follow-up 8 th – 25 th April
Population	Families of children aged 3-11 years attending two public schools in Madrid
Country	Spain
Method	<p>Recruitment: Families that were taking part in school research project about the promotion of emotional skills were invited to take part in this additional study</p> <p>Measures: System of Evaluation of Children and Adolescents (SENA) questionnaire Dimensions used: Attentional Problems, Depression, Challenging Behaviours, Emotional Regulation, Hyperactivity, and Willingness to study (for children in primary education). Plus an open-ended question, so that the families could comment on any aspect that had not been included in the questionnaire.</p> <p>Analysis: a repeated-measures ANOVA in which the psychological adjustment was contrasted in the two measures, observing the possible differences in age and sex.</p> <p>The SENA questionnaire has different items for children in Early Childhood Education (3–6 years) and Primary Education (6–12 years), so the statistical analysis for each age group separately was carried out.</p> <p>The open-ended question was coded into broad categories of change, that is, if the change reported by the family indicated a worsening of the child's condition, an improvement, or</p>

	<p>an absence of change. Likewise, the symptoms described by the families were grouped into several categories. Subsequently, the percentage of responses was calculated for both the Early Childhood and Primary Education groups.</p>
Results	<p>113 families completed the questionnaire at both data collection points (n=75 primary school aged, n=38 pre-school).</p> <p>Comparison between the pre-test and post-test scores for the Early Childhood Education group indicated very little variation in the mean scores of the five dimensions.</p> <p>Children aged between 6 and 11 scored higher in emotional regulation difficulties, attentional difficulties, hyperactivity, and impulsivity at T2. No changes were found in the Depression or Challenging behaviours scales.</p> <p>62% of the participants answered the open-ended question. The majority of families that their children's psychological state worsened, both in Early Childhood (55%) and in Primary Education (64%). In the Early Childhood group, families reported overall greater difficulties in emotional regulation (he/she is more irritable, has more mood swings, etc.), in sleeping and eating patterns (he/she does not want to sleep alone, has trouble falling asleep, has nightmares, eats more, etc.) and in potty training (he/she wets the bed again at night, has had a potty accident during the day, etc.). In the Primary Education group, families also mentioned these three types of behaviours or symptoms, but they also mentioned attentional difficulties and, above all, school difficulties. Finally, some families indicated positive changes, referring to improvements in mood (he/she is happy, is calmer, etc.) and to the positive effect of the greater availability of free time (he/she has more time to play, has more time for him/herself, etc.) and family time (he/she is delighted to be with us, enjoys playing with his/her sibling very much, has strengthened the bond with his/her siblings, etc.).</p>
Comments	<p>It is not known how representative of the wider population the participants were. The public schools involved in the original study were in middle/upper class neighbourhoods.</p>

CHARACTERISTIC	SUMMARY
Reference	Luijten MAJ, van Muilekom MM, Teela L, van Oers HA, Terwee CB, Zijlmans J, et al. The impact of lockdown during the COVID-19 pandemic on mental and social health of children and adolescents. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.02.20224667.
Aims	To compare mental and social health of children and adolescents during the COVID-19 lockdown versus before
Study design/setting	Cross-sectional study comparing two Dutch representative samples of children and adolescents; before COVID-19 (Dec 2017-July 2018) and during the COVID-19 lockdown (10 th April – 5 th May)
Population	Children and young people 8-18 years representative of the Dutch population on key demographics
Country	The Netherlands
Method	<p>Recruitment: from panel survey, approached by online research agency</p> <p>Measures: Patient-Reported Outcomes Measurement Information System (PROMIS) domains: Global Health, Peer Relationships, Anxiety, Depressive Symptoms, Anger and Sleep-Related Impairment. Three closed-ended questions for parents about whether there was a negative change in work situation of one of the parents/caregivers due to COVID-19 regulations, whether a friend or relative had been infected with COVID19 and if the child still attended child care/school during lockdown. For children, item on atmosphere at home pre-Covid and during lockdown and an open question regarding the impact of the regulations on the child/adolescent's daily life.</p> <p>For PROMIS domains, total scores are calculated by transforming the item scores into a T-score.</p> <p>Analysis: descriptive analyses (mean and percentages) were used to characterize the participants in the different samples. To compare samples, independent T-tests (for</p>

	<p>continuous variables) or chi-square tests of independence (for categorical variables) were performed.</p> <p>To test whether mental and social health of the sample during COVID-19 differed from the sample before COVID-19, a one-way analysis of covariance (ANCOVA) was performed per PROMIS domain, adjusted for differences in sociodemographic characteristics. A mean difference in domain T-scores of 0.25 SDs was considered meaningful. Severe symptoms or poor functioning was defined as a T-score 1.5 SD above or below the mean T-score before COVID-19 respectively, except for Peer Relationships, where 2 SD was used as cut-off for poor functioning. Differences in proportions of severe scores were tested using chi-squares tests of independence and the relative risk (RR) with 95% confidence intervals (95% CI) were reported.</p> <p>To determine which variables were significantly associated with mental and social health during the COVID-19 lockdown, a multivariable linear regression analysis was performed. Independent variables: age, gender, parental country of birth, marital status, region, number of children in the family, parental educational level, change in work situation due to COVID-19 regulations, infected relative/friend with COVID-19 and if the child still attended child care/school during lockdown.</p> <p>To assess the impact of the COVID-19 lockdown on the daily life of children, the open ended question 'How are the corona-regulations for you?' was qualitatively analysed using thematic analysis. The answers were categorized into positive, neutral or negative experiences and, thereafter, clustered into themes. Themes were ranked according to their frequency of occurrence (high to low).</p>
Results	<p>844 children and young people took part in the during-lockdown study. Pre-Covid n=2401.</p> <p>During the COVID-19 lockdown, children and adolescents reported worse T-scores than children and adolescents before the COVID-19 lockdown on all PROMIS domains, after controlling for age, parental country of birth, parental educational level and number of children (absolute mean difference range, 2.06–7.05; absolute 95% CI range, 1.25–7.86). Largest differences were found for Anxiety (mean difference=7.1, 95% CI, 6.2-7.9) and Depressive Symptoms (mean difference=4.9; 95% CI, 4.0– 5.7).</p>

Significantly more children reported severe Anxiety (during 16.7% versus before 8.6%; RR, 1.95; 95% CI, 1.55–2.46) and severe Sleep-Related Impairment (during 11.5% versus before 6.1%; RR, 1.89; 95% CI 1.29–2.78) during the COVID-19 lockdown than before COVID-19. Fewer children reported poor Global Health (during 1.7% versus before 4.6%; RR, 0.36; 95% CI, 0.20–0.65).

Lower Global Health was associated with a single-parent family (B=-3.00; 95% CI, -4.23 – -1.76). Lower Peer Relationships were reported by boys compared to girls (B=-1.25; 95% CI, -2.23 – -0.27). Increased Anxiety was associated with age (B=-0.34; 95% CI, -0.53 – -0.15), a single-parent family (B=1.46; 95% CI, 0.11–2.81), an infected relative or friend (B=1.94; 95% CI, 0.72–3.16) and parents with a negative change in work (B=3.01; 95% CI, 1.84–4.18). More Depressive Symptoms was associated highly educated parents (where intermediate differed from lower; B=2.24; 95% CI, 0.23– 4.24) and parents with a negative change in work situation (B=2.45; 95% CI, 1.20–3.70). More Anger was associated with age (B=-0.47; 95% CI, -0.67 – -0.28), highly educated parents (where intermediate differed from lower; B=2.30, 95% CI, 0.27–4.33 and high differed from lower; B=2.10; 95% CI, 0.01– 4.19), three or more children (B=2.07; 95% CI, 0.52–3.62) and parents with a negative change in work situation (B=1.71; 95% CI, 0.45–2.98). Finally, more Sleep-Related Impairment was related to the country of birth of parents (\geq one foreign parent; B=1.95; 95% CI, 0.13–3.77), a single parent family (B=2.07; 95% CI, 0.53–3.62) and parents with a negative change in work (B=2.53; 95% CI, 1.19–3.87).

Children and adolescents reported a worse atmosphere (mean difference=-3.1; 95% CI, -4.1 – -2.1) at home during the COVID-19 lockdown (M=78.2, SD=17.9) than before COVID-19 (M=81.4, SD=16.0).

The majority (~90%) of children indicated that the COVID-19 lockdown had a negative impact on their daily life. The most often mentioned issues (>50 children) were: 1) missing contact with friends, 2) not allowed to go to school, 3) missing freedom, 4) not allowed to participate in sports, 5) missing joyful activities (e.g., birthdays, holidays, parties, shopping), 6) difficulties with home schooling 7) missing extended family, and 8) boredom. A minority of children did not experience any difficulties with the COVID-19 lockdown regulations (~7%) (e.g., 'It does not bother me') or reported positive consequences (~3%) (e.g., 'I really like that I can play with children in my neighbourhood all day long').

Comments	Recruitment source of bias. Recall bias for atmosphere at home. Representative of the wider population?
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CHARACTERISTIC	SUMMARY
Reference	Morelli M, Cattelino E, Baiocco R, Trumello C, Babore A, Candelori C, et al. Parents and Children During the COVID-19 Lockdown: The Influence of Parenting Distress and Parenting Self-Efficacy on Children’s Emotional Well-Being. Front Psychol 2020;11:584645. doi:10.3389/fpsyg.2020.584645.
Aims	To investigate a path model in which parenting self-efficacy and parents’ regulatory emotional self-efficacy (related to COVID-19 lockdown) mediated the relationship between parents’ psychological distress and both children’s emotional regulation, and children’s lability/negativity.
Study design/setting	Cross-sectional online survey; April 2020
Population	Parents with a child aged 6-13 years
Country	Italy
Method	<p>Recruitment: through social media and snowballing</p> <p>Measures:</p> <p>COVID risk index: A composite index was created giving one point for each of the following risk factors, if present: (a) relatives that tested positive for SARS-COV-2, (b) friends or acquaintances that tested positive for SARS-COV-2, (c) hospitalized relatives due to SARS-COV-2, (d) living in northern Italy (e) being a health worker, and (f) being a health worker in hospital departments that treated SARS-COV-2 positive patients.</p> <p>Family risk index: a composite index was created given one point for each of the following risk factors: (a) a lower SES, (b) a worsened working situation during the quarantine, and</p>

	<p>(c) being a single or divorced parent who had to manage her/his own children at home alone during the quarantine.</p> <p>Parents: the Perceived Stress Scale, The Regulatory Emotional Self-Efficacy Scale, The Parenting Self-Agency Measures</p> <p>Children: the short version of the Emotion Regulation Checklist (parent-report).</p> <p>Analysis: bivariate correlations among variables were calculated along with descriptives. Afterward, a mediation analysis with latent variables was performed via SEM, employing a parcelling strategy. Model fit was evaluated with the following indices: (a) the Comparative Fit Index (CFI); (b) the Tucker–Lewis index (TLI); (c) the root mean squared error of approximation (RMSEA); (d) and the standardized root mean square residual (SRMR).</p>
Results	<p>Complete information was received 244 parents.</p> <p>The family risk index was positively related with parents’ psychological distress and positively with lability/negativity. Parents’ psychological distress was negatively related with parenting self-efficacy, parents’ regulatory emotion self-efficacy, and children’s emotion regulation and was positively related with children’s lability/negativity. Parenting self-efficacy was positively related with parents’ regulatory emotion self-efficacy, and children’s emotion regulation, and was negatively related with children’s lability/negativity. Parents’ regulatory emotion self-efficacy was positively related with children’s emotion regulation and negatively related with children’s lability/negativity. Finally, children’s emotion regulation was negatively related with children’s lability/negativity.</p> <p>Parenting self-efficacy mediated the effect of parents’ psychological distress and parents’ regulatory emotional self-efficacy on both children’s emotional regulation and children’s lability/negativity.</p> <p>COVID risk index and the family risk index partially contributed to the psychological distress of parents, parents’ psychological distress impacted on the emotional regulation and lability/negativity of their children passing through the mediators’ effect of parenting self-efficacy and parents’ regulatory emotion self-efficacy.</p>
Comments	<p>Recruitment method introduces source of bias. Parents’ perspective. It is not known how representative of wider population those taken part were. Parents’ socioeconomic status</p>

	(SES) was predominantly medium-high (92.1%; n = 255). 195 parents (70.4%) continued to work and earn as before the quarantine. 91.7% of parents (n = 254) did not have any relative tested positive for the SARS-COV-2.
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CHARACTERISTIC	SUMMARY
Reference	Rogers AA, Ha T, Ockey S. Adolescents' Perceived Socio-Emotional Impact of COVID-19 and Implications for Mental Health: Results From a U.S.-Based Mixed-Methods Study. J Adolesc Health 2020. doi:10.1016/j.jadohealth.2020.09.039.
Aims	To explore adolescents' subjective experiences of how COVID-19 had affected their relationships and their mood states and to examine whether these perceptions were associated with their mental health above and beyond their pre-pandemic mental health levels.
Study design/setting	longitudinal mixed-methods; T1 October 2019 (pre-Covid), T2 April 2020 (during Covid)
Population	Adolescents (14-17 years)
Country	US
Method	<p>Recruitment: recruited through a third-party research service, which retains a nationally representative database of research participants gathered through digital advertising channels and address-based sampling methods. A stratified random sample of parents/guardians of adolescent children was drawn from this database, using national quotas for race/ethnicity, formal education, and child sex. Just under 1,000 parents were contacted through the service's online survey platform.</p> <p>Measures: At both time points, depressive symptoms were measured using the Children's Depression Inventory short version, anxiety symptoms were measured using the seven-item Generalized Anxiety Disorder Scale, and loneliness was assessed using the Three-Item Loneliness Scale. Participants rated their symptoms over the past 7 days.</p>

	<p>At T1, adolescents reported their sex, mothers' education, and racial/ethnic identity. Primary caregivers reported annual household income and adolescent address of residence.</p> <p>At T2, adolescents were asked to provide brief open-ended responses describing their experiences with COVID-19 and social distancing. In addition, they were asked about how their relationships and their mood had changed during COVID-19.</p> <p>Analysis: Adolescents' open-ended responses were analysed with a grounded theory approach. Quantitative data was then used to identify descriptive patterns among key variables. To test whether perceived changes in relationship dynamics and mood during COVID-19 were associated with mental health problems, separate hierarchical linear regression models for depressive symptoms, anxiety symptoms, and loneliness were conducted</p>
Results	<p>609 adolescents took part in the pre-Covid study; 407 took part in both pre-Covid and during-Covid studies, aged 14 to 17 years (Mean age 15.42, SD± 1.16).</p> <p><u>Challenges of COVID-19</u></p> <p>Less In-Person Interaction; Many adolescents identified the inability to physically gather with others as challenging.</p> <p>Not Getting: Some adolescents were frustrated by the inability to get out of the house.</p> <p>Too Much Family Time: Some adolescents reported difficulties arising from increased time with their families, noting particularly the lack of privacy and personal space.</p> <p>COVID-Related Angst: Some adolescents expressed fear and anxiety surrounding the virus</p> <p>"In a Funk": Another group reported emotional difficulties and struggled to get going, as if they were "in a funk."</p> <p>School Stress: The shift to online, remote learning created mental and emotional strain for others</p> <p><u>Positives of COVID-19</u></p> <p>There are no positives: In response to being asked if there were any positives about these changes, either emotionally or relationally, many reported that there were none (e.g., "no" or "not at all").</p>

	<p>More Time with Family: Some reported positives in the increased time with family. Being able to spend more time with parents and siblings was enjoyable and a source of social support.</p> <p>More Time for Myself: Other adolescents enjoyed the increased personal time.</p> <p>Improved Friendships: A subgroup said that COVID19 and social distancing had led to improvements in their friendships.</p> <p>On average, adolescents reported low levels of mental health problems at T1, which were relatively stable over time, although paired samples t-tests revealed small significant increases in depressive symptoms ($t(406) = 3.88, p < .001; \text{Cohen's } d = .19$), anxiety symptoms ($t(406) = 5.92, p < .001; \text{Cohen's } d = .28$), and loneliness ($t(406) = 5.52, p < .001; \text{Cohen's } d = .27$) from October 2019 to April 2020.</p> <p>The majority of adolescents reported increases in negative affect and decreases in positive affect during COVID-19. Girls perceived greater increases in friend conflict than boys. White adolescents perceived greater increases in family conflict than Latinx adolescents and less family support than African American adolescents. Adolescents from urban communities perceived more pronounced declines in positive affect and greater time spent with family than adolescents residing in rural communities. Adolescents from lower income households perceived greater increases in negative affect and more pronounced decreases in positive affect. They also perceived greater conflict with parents and less support from friends during COVID-19.</p> <p>Adolescents whose mothers had more formal education reported lower depressive symptoms at T2. Perceived changes in negative affect and conflict with family were positively associated with T2 depressive symptoms. Perceived changes in friend support were negatively associated with depressive symptoms.</p> <p>Perceived changes in negative affect and conflict with friends were positively associated with anxiety at T2; perceived changes in positive affect were negatively associated with anxiety at T2.</p> <p>Loneliness at T2 was positively associated with perceived changes in negative affect and family conflict and negatively associated with perceived change in time spent with friends</p>
Comments	Recruitment bias. Representative of wider population?

CHARACTERISTIC	SUMMARY
Reference	Spinelli M, Lionetti F, Setti A, Fasolo M. Parenting Stress During the COVID-19 Outbreak: Socioeconomic and Environmental Risk Factors and Implications for Children Emotion Regulation. Fam Process 2020. doi:10.1111/famp.12601.
Aims	To examine family wellbeing during COVID-19 outbreak
Study design/setting	Longitudinal survey; this paper reports baseline data collection 2 nd –7 th April
Population	Parents of children aged 2-14 years
Country	Italy
Method	<p>Recruitment: through social media</p> <p>Measures:</p> <ul style="list-style-type: none"> • Socioeconomic risk index (SES risk index): An ad hoc dichotomy risk index was computed to evaluate the level of family economic risk (0 = no-risk; 1 = at-risk). If at least one of the following was present, the parent was considered at risk: loss of job due to the pandemic, total family income less than 1250 € per month, parent education level lower than high school. • Quarantine parent risk index: Difficulties experienced by parents during the lockdown were investigated with a pool of 13 items. Parents were asked to indicate, using a 7point Likert scale, during the past week how difficult they perceived dealing with several aspects related to the lockdown such as finding space and time for themselves, the partner, and kids, balance family and work, focus on work, do activities such as reading, and cooking. • Parent dyadic parenting stress: subscale Parent-Child Dysfunctional interaction domain of the Parenting Stress Index Short Form • Parent involvement with the child: seven items of the Family involvement subdomain of the Parent Report Form CHIP-Child Edition

	<ul style="list-style-type: none"> • Household chaos: shortened version of the CHAOS-Chaos, Hubbub, and Order Scale • Children’s emotion regulation: the Italian version of the Emotion Regulation Checklist (parent-report). <p>Analysis: descriptive statistics and bivariate correlations among study variables in the full sample and separately in the two groups differing for SES levels. Estimated a multivariate mediation model with PSI Parenting stress predicting ERC Emotion Regulation and ERC Negativity through the mediating role of Parental involvement. Two environmental factors, that is household chaos and quarantine parent risk index, were included in the model as predictors of PSI Parenting stress.</p>
Results	<p>810 parents took part. 93% mothers, mean age= 39.09 (SD 5.98), educational level: 6% less than high school degree, 39% high school degree, 34% bachelor or master degree, 20% higher education degree and 7% were fathers, mean age= 41.9 (SD6.68), educational level: 2% less than high school degree, 36% high school degree; 38% bachelor or master degree, 24% higher education degree. 185 participants (22.84%) were in the SES at-risk group. Of these, 58% had lost the job due to the pandemic.</p> <p>The quarantine parent risk index positively and moderately correlated with household chaos ($r = .46$) and, to a lower extent, with PSI Parenting stress ($r = .21$) and children’s ERC Negativity ($r = .27$). Associations between quarantine parent risk index and parent involvement and children’s ERC Emotion Regulation were low and negative (both equal to $r = .12$). Household chaos showed a moderate and positive correlation with PSI Parenting stress ($r = .37$) and children’s ERC Negativity ($r = .41$), and a moderate and negative correlation with Parental Involvement ($r = .28$) and children’s ERC Emotion Regulation ($r = .30$). Parental involvement was negatively and moderately associated with PSI Parenting stress ($r = .40$) and children’s ERC Negativity ($r = .24$), and positively correlated, to a comparable extent, with children’s ERC Emotion Regulation ($r = .31$). PSI Parenting stress correlated positively and moderately with ERC Negativity ($r = .48$) and negatively and moderately with ERC Emotion Regulation ($r = .43$).</p> <p>The quarantine parent risk index presented a stronger association with PSI Parenting stress in the SES no-risk group compared to the SES at-risk group (associations were $r = .25$ and $r = .12$, respectively).</p>

	<p>Overall, mean values across the study variables in the two groups were comparable except for the quarantine parent risk index, which was significantly higher in the SES no-risk group ($t(295.77) = 3.22, p = .001$), and for ERC Negativity, which was significantly higher in the SES at-risk group ($t(291.02) = 2.31, p = .02$). For emotion regulation competences, in the SES no-risk group only 3% of children scored two standard deviations above ERC Negativity compared to 7% in the SES at-risk group.</p> <p>The quarantine parent risk index significantly predicted PSI Parenting stress only for SES no-risk group.</p> <p>In families belonging to the SES at-risk group, Parental Involvement was a significant mediator of the impact of PSI Parenting stress and ERC Negativity (indirect effect $\beta = .06, p = .051$, total effect $\beta = .56, p < .001, R^2 = .36$) and ERC Emotion Regulation (indirect effect $\beta = .09, p = .002$, total effect $\beta = .50, p < .001, R^2 = .30$). On the contrary, in the SES no-risk group, Parental Involvement mediated the impact of PSI Parenting stress on ERC Emotion Regulation (indirect effect $\beta = .06, p = .02$, total effect $\beta = .40, p < .001, R^2 = .18$), but not on ERC Negativity (indirect effect $\beta = .02, p = .30$, total effect $\beta = .44, p < .001, R^2 = .20$).</p>
Comments	Method of recruitment introduces a source of bias. It is not known how representative of the wider population those taking part were.

Returning to school

CHARACTERISTIC	SUMMARY
Reference	Children's Commissioner for England. Some sort of normal. What children want from schools now
Aims	To find out from children how they have found going back to school
Study design/setting	Survey commissioned by Children's Commissioner for England; 5 th -11 th October.

Population	Children (8-17 years) who had been back to school in some way since the start of the September term
Country	England
Method	<p>Recruitment: not stated</p> <p>Measures: children were given several statements about being back at school and asked to say whether they agreed or disagreed.</p> <p>Analysis: Data weighted prior to reporting to produce nationally representative figures.</p>
Results	<p>1500 children (n=568 primary school-aged, n=932 secondary school-aged)</p> <p>71% of all children surveyed agreed with the statement that they were excited to be back at school. This was highest amongst primary school students, where 80% agreed they were excited to be back, compared to 65% of secondary school pupils. Girls were also more likely to agree than boys (75% compared to 66%). Children with two parents/guardians living in the household with them were statistically significantly more likely to agree that they were excited to be back than children with one parent/guardian (72% compared to 66%).</p> <p>93% of children agreed with 'I am happy to see my school friends again'. This was slightly higher among primary school pupils, 95% of which agreed with the statement, compared to 92% of secondary pupils.</p> <p>When asked which three words best described how they felt about being back at school, 59% of all children chose 'happy' while 45% selected 'excited'. Among primary school pupils, 66% selected 'happy' and 59% selected 'excited', statistically significantly more than secondary school pupils, 54% of which selected 'happy' and only 36% selected 'excited'. 1 in 4 secondary school pupils selected 'nervous', 1 in 5 selected 'worried' and a similar amount selected 'stressed'. These rates were statistically significantly higher than for primary school children.</p> <p>71% of children agreed with 'I feel safe at school'. Again, primary school students were statistically significantly more likely to agree with this than children at secondary school</p>

(78% compared to 66%), and girls agreed that they felt safe more than boys did (74% compared to 67%).

1 in 3 children in the survey agreed with the statement 'I find it stressful to be back at school' – however, 47% of children disagreed with this statement. 54% of primary school pupils disagreed with the statement, statistically significantly more than the 42% of secondary school pupils. Children with one parent/guardian living in the household with them were the most likely to feel stressed about being back at school compared to children with two parents/guardians living in the household (44% compared to 30%).

Half of children (50%) agreed with the statement 'I am worried that I will struggle to catch up with my schoolwork this year', while 29% disagreed. Agreement increased to 54% for secondary school pupils, statistically significantly more than the 44% of primary school pupils. Secondary school pupils were also statistically significantly less likely to disagree with this compared to primary.

Almost two-thirds of all children (63%) agreed with the statement 'I am worried about not being able to go school if my class has to self-isolate, or there is a 'local lockdown' and my school closes'. Girls were more worried about this than boys, with 68% agreeing compared to 58% of boys. There was no difference between primary and secondary age children, with children of all ages roughly as likely to be worried about this.

Two thirds of children (66%) agreed with the statement 'I have everything I need to learn effectively from home if I need to' and 16% disagreed with this. While there were no significant differences by age or gender, agreement declined to 52% of children who had at least one parent/guardian who was unemployed.

68% of children overall felt that their mental health was going well, 14% (around 1 in 7) felt that their mental health was not going well. This increased to 16% of girls, statistically significantly more than boys (12%). 65% of secondary school pupils felt that their mental health was going well, statistically significantly less than the percentage of primary school pupils, 72% of which felt this was going well.

Half of children (50%) felt that their levels of stress were going well, while just over 1 in 4 (26%) felt that their levels of stress were not going well.

	<p>Children’s confidence at school was high, with 67% of children feeling like this is going well. 37% of primary school pupils felt that this was going really well (scored it as 5) statistically significantly more than the 31% of secondary school pupils who selected this. However, 16% of children who had one parent/guardian living in the household with them felt that their confidence was not going well, statistically significantly more than the 11% of children who had two parents/guardians living in the household. Children with one parent/guardian in the household were also significantly less likely to think this was going well (58%) compared to children with two parents/guardians in the household (70%).</p> <p>79% of children felt that their friendships were going well and there were no statistically significant differences by gender or school age. However, the percentage who felt friendships were going well declined to 70% for children with one parent/guardian living in the household, statistically significantly less than the 82% of children with two parents/guardians living in the household. 11% of children with one parent/guardian living in the household felt their friendships were not going well, also statistically significantly more than the 6% of children with two parents/guardians living in the household.</p> <p>83% of all children felt that family relationships were going well. This was statistically significantly higher for primary school pupils (86%) compared to secondary (81%). However, the same pattern as for confidence and friendships continued, with 73% of children with one parent/guardian living in the household feeling like this was going well, statistically significantly less than the 85% of children with two parents/guardians living in the household with them. The same pattern persists with relationships with teachers, where only 59% of children with one parent/guardian living in the household felt these were going well, statistically significantly less than the 75% of children with two parents/guardians living in the household. They were also more likely to feel these relationships were not going well (15% compared to only 9%).</p>
	Representative of wider population?

CHARACTERISTIC	SUMMARY
Reference	Limbers CA. Factors Associated with Caregiver Preferences for Children’s Return to School during the COVID-19 Pandemic. J Sch Health n.d.
Aims	To assess caregiver preferences for on-campus versus virtual learning at home during the fall and factors associated with these preferences.
Study design/setting	Cross-sectional on-line survey; 1-13 th July when community prevalence was high in Texas
Population	Caregivers of children and young people enrolled in pre-Kindergarten to high school 2019-20 in one public school district in Texas.
Country	US
Method	<p>Recruitment: Caregivers (n=8375) were emailed to invite to take part in survey</p> <p>Measures: Caregivers indicated the grade level and campus their students planned to attend during the 2020 to 2021 academic year. Caregivers were asked:</p> <p>i) “How would you prefer for your student to start the school year?” The response options were: “On-campus/traditional,” “On-campus and virtual hybrid schedule,” and, “Fully virtual.”</p> <p>ii) “Which of these factors are ‘line in the sand’ factors that absolutely affect your decision? Check all that apply.” Response options were, “We do not have childcare options for hybrid schedules,” “Available elective course offerings in virtual school,” “Participation in extracurriculars,” “School meals,” “I don’t want mandatory masks for children,” “I do want mandatory masks for children,” “I do not want mandatory social distancing requirements,” “I do want mandatory social distancing requirements,” and “Other_____.”</p> <p>Analysis: Frequencies were computed to determine the percentage of students at each school level (i.e., elementary, intermediate, middle, and high school) and the percentage</p>

	<p>of caregivers that endorsed each of the instruction format options (ie, fully virtual, traditional face-to-face, on-campus/virtual hybrid).</p> <p>Chi-square tests were used to assess if there were systematic differences between caregiver preferences for instruction format based on student school level. Polynomial logistic regression analysis was used to examine the multivariate associations between caregiver preferences for instruction format and 'line in the sand' factors that absolutely affect caregiver decisions. A content analysis was performed on the 'other' responses.</p>
Results	<p>4436 responded (53% response rate). 1660 (37.3%) were expected to be in elementary school (pre-kindergarten-4th grade) during the 2020 to 2021 academic year, 673 (15.2%) in intermediate school (5th-6th grade), 721 (16.3%) in middle school (7th-8th grade), and 1382 (31.2%) in high school (9th-12th grade).</p> <p>800 (18%) endorsed a preference for a fully virtual instruction format for the start of the 2020 to 2021 academic year, 2306 caregivers (52%) endorsed a preference for a traditional, face-to-face instruction format, and 1330 caregivers (30%) endorsed a preference for an on-campus/virtual hybrid instructional format.</p> <p>Caregivers of middle-school students (33.6%) were more likely to endorse a preference for an on-campus/virtual hybrid instructional format compared to caregivers of elementary school students (26.3%). Caregivers of middle-school students (50.5%) were less likely to endorse a preference for a traditional, face-to-face instructional format compared to caregivers of elementary school students (55.2%). Statistically significant.</p> <p>Caregivers of high-school students (32.3%) were more likely to endorse a preference for an on-campus/virtual hybrid instructional format compared to caregivers of elementary school students (26.3%). Caregivers of high-school students (49.3%) were less likely to endorse a preference for a traditional, face-to-face instructional format compared to caregivers of elementary school students (55.2%). Statistically significant.</p> <p>Concerns about child's health/safety had the strongest association with caregiver preferences for instruction format (odds ratios 34.26-12.75; $p < .001$).</p>

Comments	The survey was anonymous and no socio-demography information was collected. It is not known how representative those taking part were of the wider population. The method of recruitment may have introduced a source of bias.
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Healthcare use

CHARACTERISTIC	SUMMARY
Reference	Kuitunen I, Haapanen M, Artama M, Renko M. Closing Finnish schools and day care centres had a greater impact on primary care than secondary care emergency department visits. Acta Paediatr 2020. doi:10.1111/apa.15646.
Aims	To examine the effects the school and day care closures had on paediatric hospital visits
Study design/setting	Retrospective analysis of routinely collected data
Population	Paediatric patients (0-15 years)
Country	Finland
Method	<p>Patient discharge records at a single hospital which provided round-the-clock primary and secondary level care for a paediatric population of up to 19,000. The study period from 1 January 2020 to 30 September 2020 was compared with the corresponding dates in 2019.</p> <p>Dates of primary care and secondary care emergency department visits, the patient's age and whether they were hospitalised were collected. The data was divided into age groups: under one year of age, day care (1-6 years) and lower (7-12 years) and upper (13-15 years) elementary school.</p> <p>Analysis: chi-square test was used for categorised variables and the Mann-Whitney U test for continuous variables.</p>
Results	The number of visit to both primary care and secondary emergency department visits were lower in 2020 compared to 2019 (4490 in 2020, 5441 in 2019). Primary care emergency

	<p>department 3579 in 2020 compared to 4421 in 2019. Secondary care emergency department visits 911 in 2020 and 1020 in 2019.</p> <p>The weekly median number of emergency department visits was 122 (IQR 45) in 2020 and 139 (interquartile range 30) in 2019 ($P < .001$). Emergency department visits reached 2019 levels during the summer vacation and remained at 2019 levels in September 2020.</p> <p>In 2020, 275 children were hospitalised, compared to 435 in 2019 ($P < .001$).</p> <p>The decrease in emergency department visits during lockdown was not as prominent in children aged 7-12 as in children attending day care.</p>
Comments	<p>There is information missing from this brief report. No data tables are presented. It is not known how representative of the wider population those attending the single hospital were. It is not clear what the difference between primary care and secondary emergency departments are.</p>

Appendix 3: Excluded studies

Reference	Exclusion Reason
Bi Q, Lessler J, Eckerle I, Lauer SA, Kaiser L, Vuilleumier N, et al. Household Transmission of SARS-COV-2: Insights from a Population-based Serological Survey. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.04.20225573 .	Wrong outcomes
European Centre for Disease Prevention and Control. COVID-19 in Children and the Role of School Settings in COVID-19 Transmission n.d.	Published before October 2020
Greenway CW, Eaton-Thomas K. Parent experiences of home-schooling children with special educational needs or disabilities during the coronavirus pandemic. <i>British Journal of Special Education</i> 2020. doi:10.1111/1467-8578.12341 .	Full text requested from Knowledge Services
Guthrie BL, Tordoff DM, Meisner J. Summary of School Re-Opening Models and Implementation Approaches During the COVID 19 Pandemic n.d.	Wrong outcomes
Hoehl S, Kreutzer E, Schenk B, Westhaus S, Foppa I, Herrmann E, et al. Longitudinal testing for respiratory and gastrointestinal shedding of SARS-CoV-2 in day care centres in Hesse, Germany. Results of the SAFE KiDS Study. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.02.20223859 .	Wrong outcomes
Iqbal SA, Tayyab N. COVID-19 and Children: The Mental & Physical Reverberations of the Pandemic. <i>Child Care Health Dev</i> 2020. doi:10.1111/cch.12822 .	Commentary or editorial or letter or opinion or position statement or news article or view point
Keeping children safe in childcare: coronavirus GOV.WALES n.d.	Guidance
Kuwelker K, Zhou F, Blomberg B, Lartey S, Brokstad KA, Trieu MC, et al. High attack rates of SARS-CoV-2 infection through household-transmission: a prospective study. <i>MedRxiv</i> 2020. doi:10.1101/2020.11.02.20224485 .	Wrong outcomes

<p>Lambert JA, Trott K, Baugh RF. An Analysis of K-12 School Reopening and Its' Impact on Teachers. J Prim Care Community Health 2020;11:2150132720967503. doi:10.1177/2150132720967503.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point</p>
<p>Lazebnik T, Bunimovich-Mendrazitsky S. The signature features of COVID-19 pandemic in a hybrid mathematical model - implications for optimal work-school lockdown policy. MedRxiv 2020. doi:10.1101/2020.11.02.20224584.</p>	<p>Modelling study</p>
<p>Ramadhan MHA, Putri AK, Melinda D, Habibah U, Fajriyah UN, Aini S, et al. Children's Mental Health in the Time of COVID-19: How Things Stand and the Aftermath. MJMS 2020;27:196–201. doi:10.21315/mjms2020.27.5.15.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point</p>
<p>Saad AA, Saad M, Boctor EM. COVID-19 Active Surveillance Simulation Case Study - Health and Economic Impacts of Active Surveillance in a School Environment. MedRxiv 2020. doi:10.1101/2020.10.28.20221416.</p>	<p>Wrong outcomes</p>
<p>Shea K, Borchering RK, Probert WJ, Howerton E, Bogich TL, Li S, et al. COVID-19 reopening strategies at the county level in the face of uncertainty: Multiple Models for Outbreak Decision Support. MedRxiv 2020. doi:10.1101/2020.11.03.20225409.</p>	<p>Modelling study</p>
<p>Transmission of COVID-19 in school settings and interventions to reduce the transmission: a rapid review [Update 1]</p>	<p>Published before October 2020</p>
<p>Viner RM, Bonell C, Drake L, Jourdan D, Davies N, Baltag V, et al. Reopening schools during the COVID-19 pandemic: governments must balance the uncertainty and risks of reopening schools against the clear harms associated with prolonged closure. Arch Dis Child 2020. doi:10.1136/archdischild-2020-319963.</p>	<p>Commentary or editorial or letter or opinion or position statement or news article or view point</p>