SARS-COV-2 TRANSMISSION IN PRIMARY SCHOOL CHILDREN

RAG 10/11/2020 – validated by RMG 12/11/2020

QUESTION

As widespread community transmission is occurring again throughout Europe and especially in Belgium, non-pharmaceutical interventions are reinforced. However, certain measures might be impossible for children to follow or even unnecessary and harmful. Not only does the role of children <12y in transmission of SARS-CoV-2 remain currently unclear, their developmental and psychological needs are different from those of adults. Finally, COVID-19 disease in children is generally accepted to be a predominantly mild disease, hence concerns are more about their role in fueling community transmission than about their individual safety, which means a careful harm/benefit evaluation should be made.

Currently, exceptions are made for children <12y regarding social distancing rules, gatherings, definition of 'close contact' and mask-wearing in schools. Now, 2 months after reopening of schools, amidst dramatically high incidence rates in the Belgian population and with more and more emphasis being placed on the possibility of airborne transmission, the RAG is asked to evaluate **whether children in primary school should wear a face mask**, as has been recommended in some other countries. Additionally, the question is asked whether the definition of high-risk contact in children in primary school should be the same as for children in secondary school.

CONTENTS

1. Recommendation

- The RAG **does NOT recommend the use of face masks for children in primary school**.

- The risk of transmission needs to be reduced by taking other risk-reducing measures. These have been previously defined in the protocols with color coding. The **color code that is used should adequately reflect the level of transmission in the community**. Hence in case of intense virus circulation in the community, schools should switch to code red, regardless of the situation within the school walls.

- Priority is given to compulsory education. **Extracurricular activities** (youth movements, sports, art academies, hobbies…) **should comply with rules that are at least as strict as the rules at school**. This is important to limit potential transmission of the virus but also to avoid confusion and poor compliance with the rules.

- **In code red, teachers in primary schools should wear face masks, even when keeping 1,5m distance**. Masks should cover mouth and nose and fit closely at the sides. Masks with a transparent part can be used to allow students to still see the lips of the teacher, which is especially important when learning to read or learning a new language, but face shields should NOT be used.

- As already defined in the current protocols, teachers in primary school should wear a mask when unable to keep distance from other adults and when in closed shared spaces. 'Mask-breaks' can be taken outdoors when keeping a distance of min. 1,5m, indoors in a private space or indoors when working quietly in a well-ventilated space and keeping a distance of min. 1,5m.

- The current definition of high-risk contact in children is maintained.

    - This means **all children of the same class group are considered low-risk contacts if a child is the index case** in primary school. Low-risk contacts can continue to go to school but should limit their contacts. This means extracurricular activities (sports, hobbies, art academy…) are not allowed for 14 days after the last low-risk contact. Priority is given to compulsory education since it is both important for the development of the child and allows parents to continue their own activities. Children who have been identified as either high or low risk contacts should not be looked after by the grandparents.
    - If case the index case is an adult (teacher or other) children are considered low-risk contacts, unless there was a continuous exposure of >15 minutes at <1,5m (which should be avoided). An exposure of >15' at <1,5m is considered a high-risk contact even if the teacher was wearing a face mask.
    - In case there is suspicion of a cluster, stricter measures can be taken.

2. Elements of discussion

- The detrimental effects of prolonged school closures on children's wellbeing, social and intellectual development and potential long-term consequences have been clearly shown. It is therefore of paramount importance to keep schools open, including when high levels of virus circulation warrant strong mitigation measures in the rest of society.
- **As the risk of school outbreaks is linked to the level of community transmission, more emphasis should be placed on risk-reducing behavior/measures in the general population.**

- Compulsory mask-wearing for students and staff alike might theoretically contribute to the possibility of keeping schools open in a safe way.
- Other countries have taken a more strict approach on wearing of masks in children, seemingly without difficulties, although benefit is equally unclear.
- We need to be prepared for an increase in case numbers again, especially since there exists a risk of re-introduction of the virus from abroad.

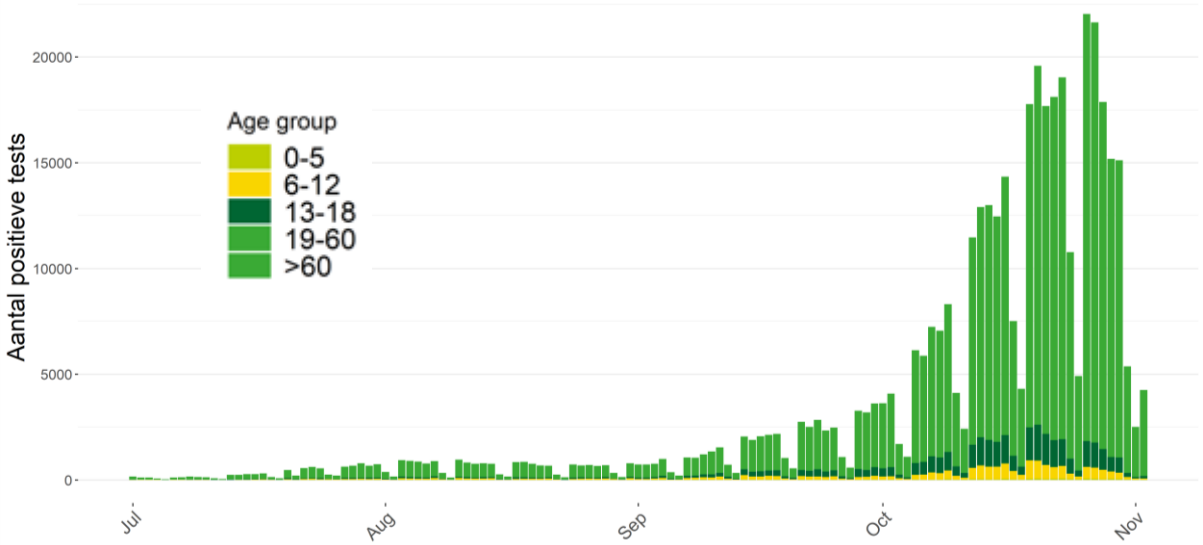
- The reduction in case numbers started before the effect of the school holidays could be seen.
- Other risk-reducing measures (e.g. smaller, fixed groups, social distancing, ventilation) should be envisaged first. Color codes had been defined for this, but have been poorly used.
- Once masks have been imposed, parents and teachers might be anxious if the obligation would later on be relaxed again (e.g. at lower levels of virus circulation).
- Being less able to see facial expressions of fellow pupils and teachers might adversely affect pupil's wellbeing and motivation to learn.
- Children with learning difficulties or for which the teaching language is not their first language might be disproportionally affected by mask wearing as it reduces interpretation of facial expression.

3. Belgian test data on infections in children

3.1. OVERALL CASE NUMBERS

Figure 1 shows the relative contributions of children in the different age groups to the total number of Belgian cases since the summer holidays. Children in primary school age make up 3,9% of all positive cases since September 1st versus 8,1% for children in secondary school age.

Figure 1: Number of confirmed cases over time since start of the summer, by age group.



3.2. TEST-POSITIVITY RATES

Differences in test-strategies (e.g. less testing in children, since they present more often with no or mild symptoms, less testing high-risk contacts) have often been cited as reason for the lower number of cases in children. However, not only the total case numbers are lower in the younger age groups, also the test-positivity rate is lower in the youngest age group (Figure 2).

Fig. 2: Evolution of test-positivity rate by age group, from beginning of summer

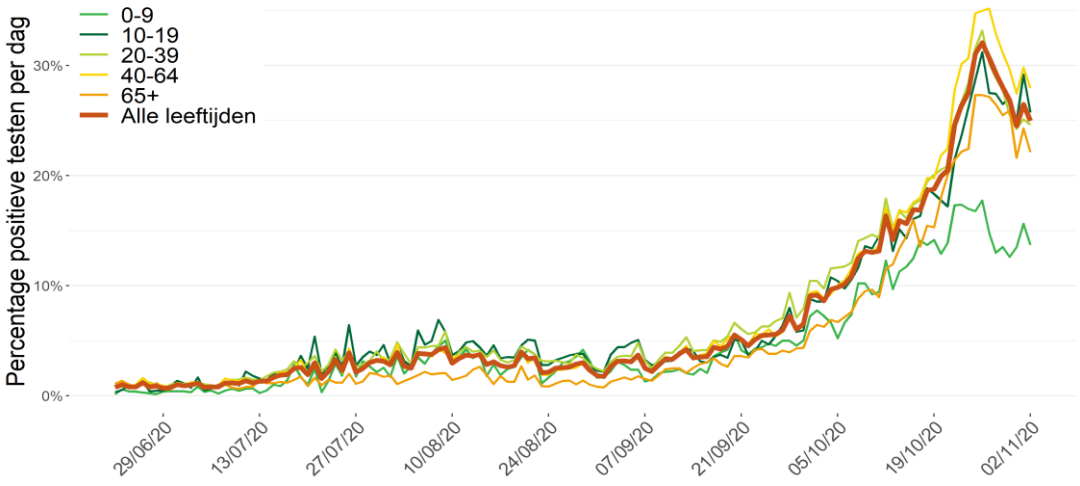


Figure 3: total number of positive and negative tests and test-positivity rate in children of primary school age (6-12 years) and secondary school age (13-18 years), since start summer holidays. Vertical line indicates 1st of September.

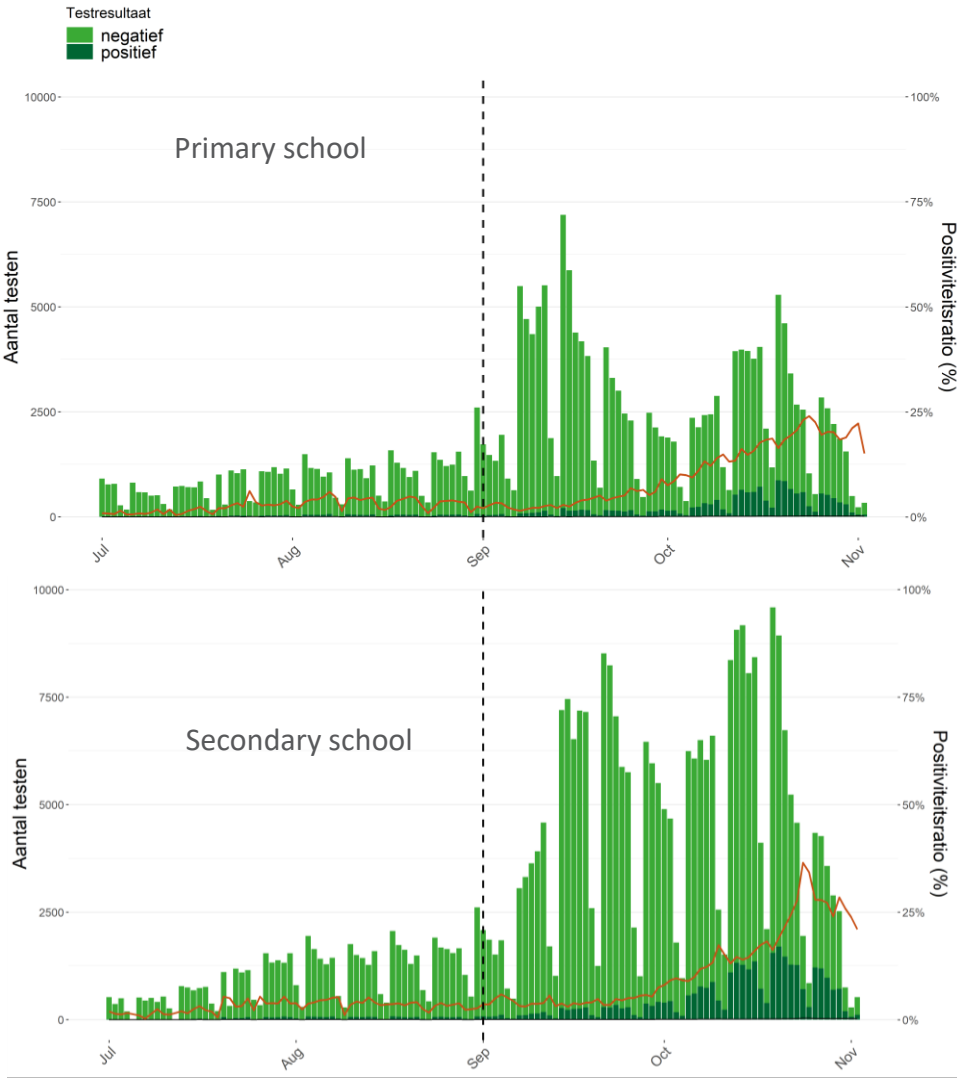
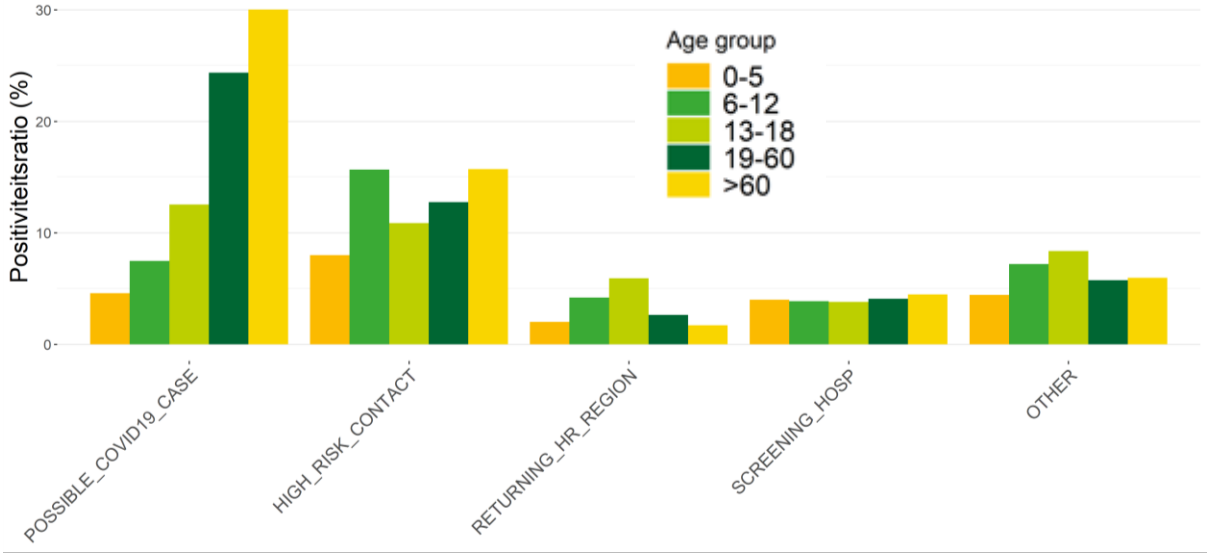


Figure 4: Test-positivity rate by age group and test indication since September 1st



Note :
- not all possible cases are tested in children 0-5y
- a stricter definition of close contacts is applied in children <12y

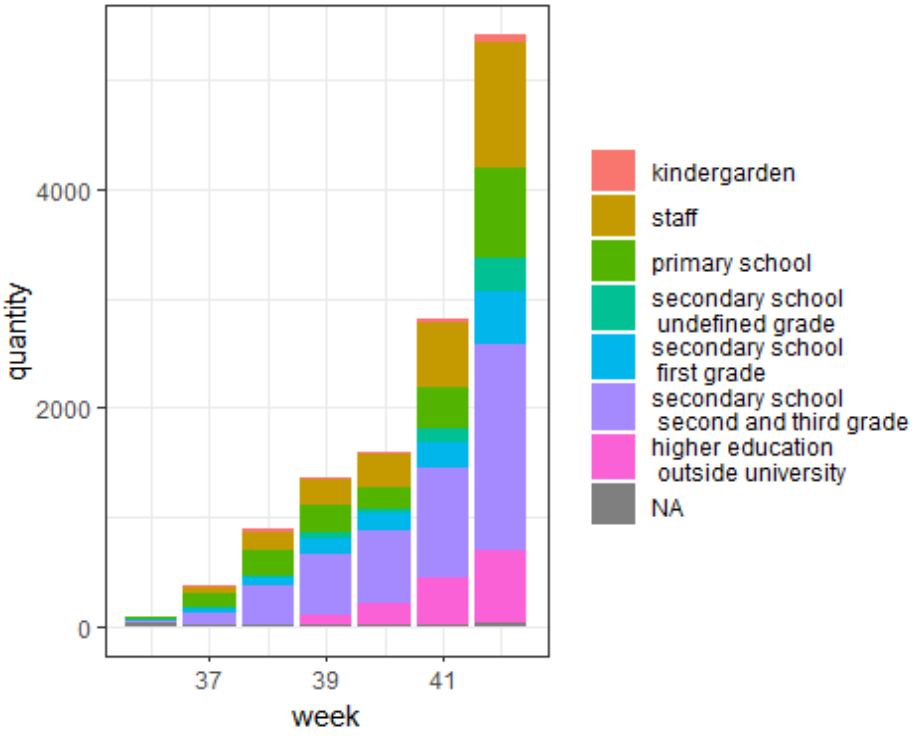
4. Data from contact tracing in schools (preliminary data)

4.1. FOR FRENCH-SPEAKING EDUCATION (DATA COLLECTED BY ONE)

Analyses are based on data from French-speaking education from September 1st until 18-10-2020 (change in test-strategy on 21/10, school holidays starting 2/11). More analyses are ongoing.

Despite roughly equal numbers of pupils in primary and secondary education, case numbers are much lower in primary school than in secondary school, especially when comparing with second and third grade. Cases in staff also represent an important part of all cases that were notified in schools.

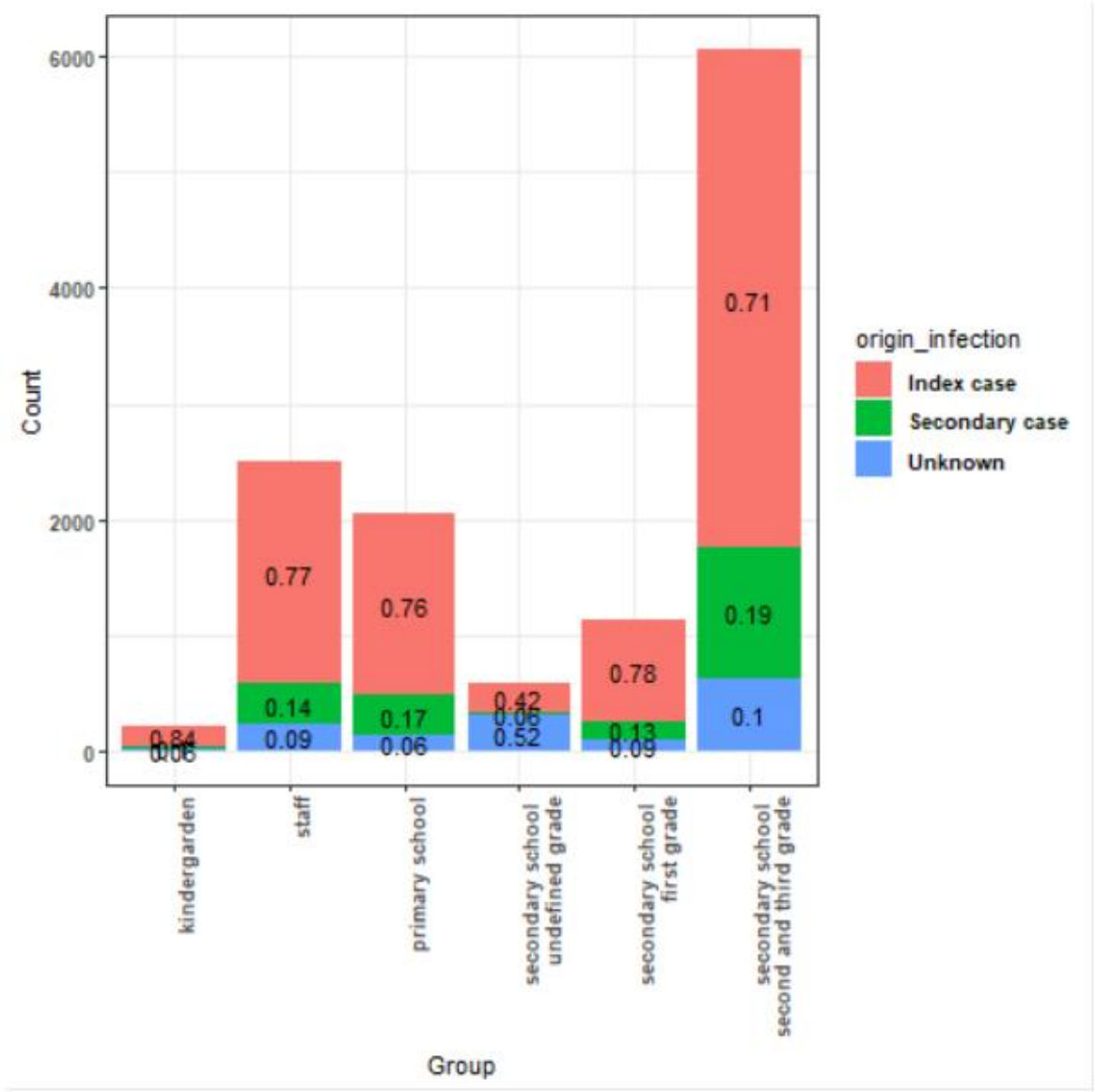
Figure 5: Number of cases reported in schools in FWB by level of education of case and week



On 25/10/2020, the cumulative incidence over the past 14 days in the data collected by ONE was 647/100,000 students in primary school and 1,838/100,000 students in secondary school. At that time, the 14d cumulative incidence for the general population was 1,770/100,000 for Wallonia and Brussel.

The majority of index cases in primary school (61%) is tested because of a high-risk exposure outside of school. In secondary schools, 54% of index cases (defined as the first unrelated case in a school group) are identified because of symptoms compatible with COVID-19, as opposed to 33% in children in primary school and 68% in staff.
Secondary cases are defined as two cases for which transmission likely occurred at school. These data need to be interpreted with caution, as it is not always clear where transmission occurred, especially at the end of October when case numbers both at school and in the broader society were very high. Whilst absolute case numbers are lower in primary schools, the proportion of cases that is a secondary case (defined as a case where transmission most likely occurred within the school context) is comparable between staff, pupils in primary and pupils in secondary school (Figure 6).

Figure 6: number and proportion of total infections that are secondary infections, by age group

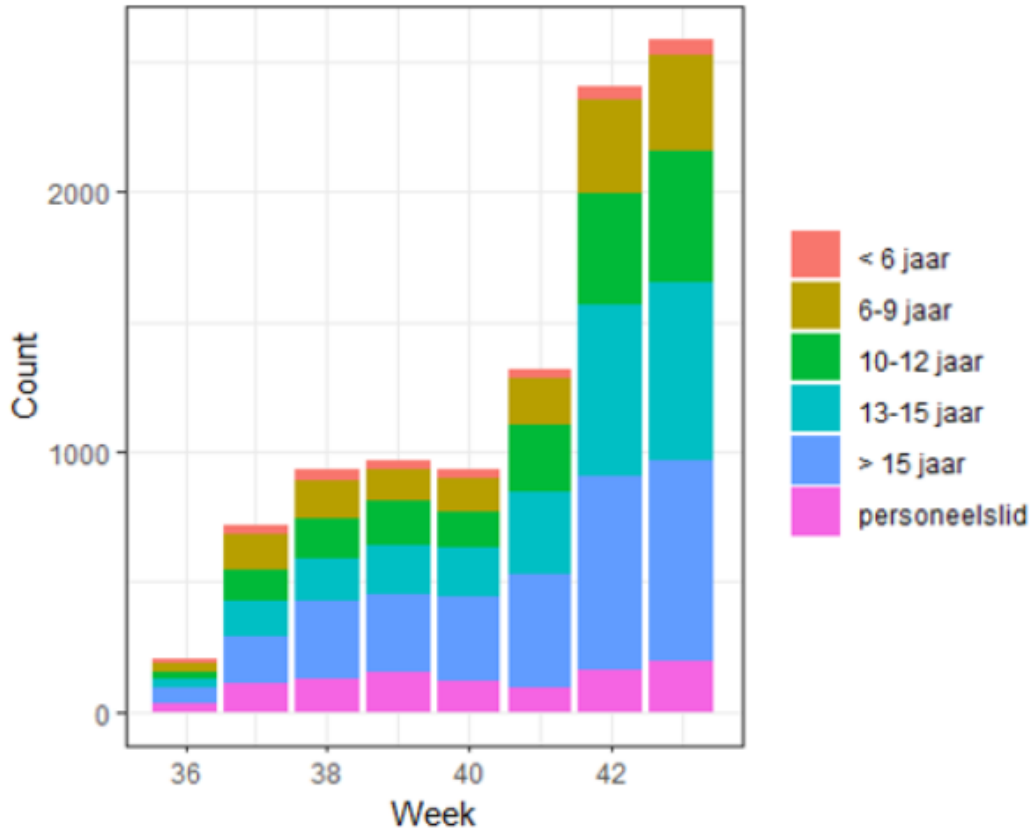


4.2. FOR FLEMISH EDUCATION (DATA COLLECTED BY CLB)

Analyses are based on data from September 1st – October 25th . More analyses are ongoing.

Similar to the total number of cases in Flanders compared to Wallonia/Brussels, cases in Flemish schools rose less steeply and slightly later than in French-speaking education, but we observe the same trend of significantly higher case numbers in the older age groups.

Figure 7: number of cases reported in Flemish schools, per age group and week



Data on secondary cases is missing for 42% of total cases, which importantly limits the interpretation of the numbers. For those with available data, for only 6% (270/4733 cases) of total index cases at least one secondary case was reported, across all age groups. For only 3.2% of index cases in primary school at least one onwards infection is reported, versus 6.9% of index cases in secondary school. We need however to bear in mind that rules regarding (testing of) high-risk contacts are different in these two groups (Table 1).

Table 1: Reported secondary cases by age group of index case

Age group index case	<6y	6-12y	≥13y (students)	staff	Total
Information unavailable	137 (52%)	1045 (38%)	1565 (36%)	710 (85%)	**3457 (42%)**
No reported sec. cases	125 (47%)	1630 (60%)	2601 (60%)	107 (13%)	**4463 (55%)**
Min. 1 secondary case	1 (0.4%)	54 (2%)	193 (4%)	22 (3%)	**270 (3%)**
Total	263 (100%)	2729 (100%)	4359 (100%)	839 (100%)	**8190 (100%)**

5. International Scientific literature

An excellent rapid review of the topic “What is the specific role of daycares and schools in COVID-19 transmission?” was performed by the Canadian Collaborative Centre for Methods and Tools and updated 22th of October (1). They conclude:

> *Based on the published reports to date from both prior to COVID-19 lockdown and following re-opening,* ***the risk of transmission from children to children and children to adults in primary school and daycare settings appears low****, particularly when infection control measures are in place. The certainty of the evidence is low (GRADE), and findings may change as new data become available.*

5.1. SUSCEPTIBILITY OF CHILDREN TO SARS-COV-2

Global case numbers in children are low. According to data from the ECDC, on 5/11/2020 children between 5-14 year represented only 4,4% of all confirmed infections with SARS-CoV-2 in the EU/UK and almost all were mild cases. In the US, children (according to state defined as <17-19y) make up 23% of the population but currently represent only 11,1% of all confirmed infections (2). In countries where widespread community testing (either PCR or serology) has been implemented, **children were less likely to test positive than adults** (3–7). However, these results might be biased if children had less exposure to the virus, e.g. because school closures were in place. Yet, even after a known exposure, **data from contact tracing studies indicates that children are less likely to get infected than adults** after exposure within the household (8–12). Mathematical modelling concluded that children are about half as likely to get infected as adults (8), a conclusion that was supported by a meta-analysis of contact tracing data by Viner et al (12). Another more recent meta-analysis by Koh et al. pooled data from 14 contact tracing studies and, likewise, found adults more likely to become infected after exposure within the household than children (<18y), with a RR of 1,71 [1.35-2.17], although there was considerable heterogeneity among the included studies. These effects seem greater for younger children (either <5y or <10y) compared to older children (13). Several mechanisms have been proposed to explain this relative resistance, from immune imprinting by other viruses (14) to distribution, maturation, and functioning of viral receptors (15).

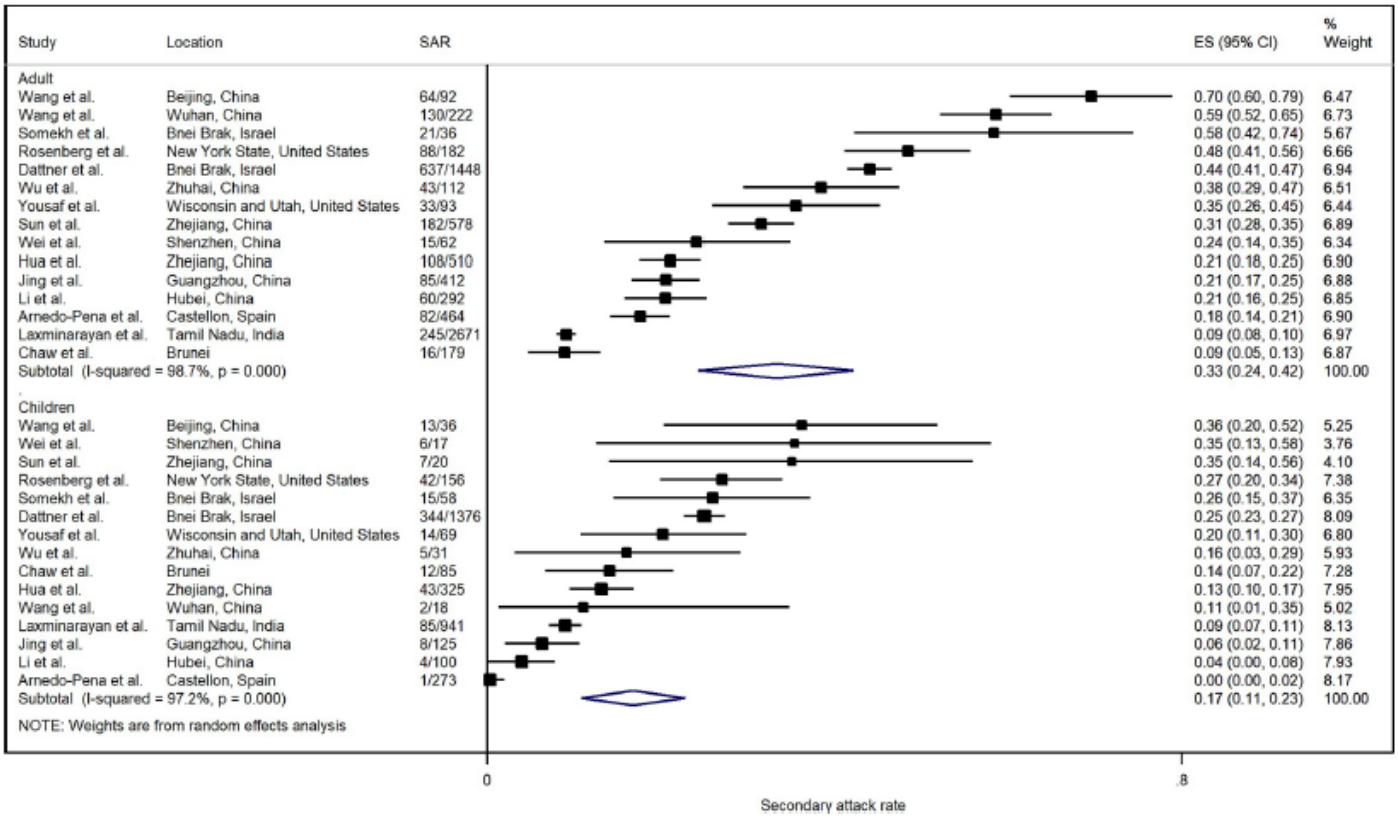


Fig 6. Forest plot of household secondary attack rates (SAR) by adult and children close contact. ES is the estimated SAR, with 95% confidence intervals (CI). I-squared is the percentage of between-study heterogeneity that is attributable to variability in the true effect, rather than sampling variation.

https://doi.org/10.1371/journal.pone.0240205.g006

Source: Koh et al.(16) *Upper part: adults, lower part: children*

5.2. ONWARDS TRANSMISSION FROM CHILDREN

Transmission of SARS-CoV-2 from children, even neonates, is plausible as shown by successful viral cultures of SARS-CoV-2 from approximately half of twenty-three RT-PCR positive symptomatic children (17). In addition, a study of 3,712 COVID-19 patients by the group of Christian Drosten in Germany reported **viral loads (estimated by real-time RT-PCR threshold cycle values) to be similar in children and adults** (18). A smaller study from the US in 49 hospitalized children did not detect any differences in viral load according to age group (19) whereas a research letter analyzing a total of 145 SARS-CoV-2 patients with mild to moderate symptoms, found a higher viral load (lower CT-values) in children <5 years old compared to older children and adults (20). However, the real-life significance of these findings is unknown.

In a literature review including 31 articles on household transmission, children were found to be the index case for household clusters in only 10% (21). Most of these studies were from Asia, but a Swiss study found similar results (8% children as index cases in the household) (22). Again, these data need to be interpreted with caution, as the likelihood of exposure for children (and hence introducing the virus into the household) might be different than for adults when strict lockdown measures are in place (23). In contrast, a more recent study from the US showed a higher potential for onwards transmission for younger children. Among 14 households where the index case was <18 years old, secondary infection rate was 53% [31-74] for children <12 years as opposed to 38% [23-56%] for children between 12-17 years old (24).

A frequent concern is **that symptoms in children are often absent or go unnoticed so they can unknowingly contribute to further spread**. However, a distinction should be made between pre-symptomatic transmission (before the onset of symptoms) and transmission from truly asymptomatic individuals. Two large meta-analyses found that truly asymptomatic cases were three times less likely

to transmit the virus to their household contacts than symptomatic cases (16,25). A study from South Korea including 91 children found 22% of SARS-CoV-2+ children to remain asymptomatic throughout the course of the disease (26), which seems no different than the overall estimate of 20-30% truly asymptomatic cases (regardless of age) which was found by Buitrago et al. in a meta-analysis including 94 studies (25). It seems however important to pay close attention to possible symptoms in children, as in the South Korean data symptoms were not noticed before diagnosis for 70% of children, despite the children being quarantined after high-risk contact or travel from abroad (26).

Onwards transmission from children (<12y) in daycare towards their parents was shown in Utah. In three day care centres, the virus was introduced by a staff member and passed on to a total of 12 children (1 child age 10 months, 11 others 6-10y old). In turn, these children transmitted the virus further to 12/46 non-facility contacts (27). An outbreak in a nursery was also reported from Poland, where the virus was introduced by an infected worker and several co-workers, children and parents of children became infected (28). Reassuringly though, a large study from the US looked at the risk of COVID-19 infection and being a child care provider (for children <6y old). Data was gathered on a total of 57,335 child care providers, of which 427 were reported COVID-19 cases. **After correcting for background transmission rates and other demographic variables and potential confounders, no association was found between exposure to child care and COVID-19 infection** (29). Of note is that most child care programs did have risk-reduction strategies in place like smaller groups and frequent handwashing and disinfection, but only 35% of staff was required to wear a mask and only 11% of facilities required mask wearing in children >2y old.
For children in primary school age, Fontanet and colleagues studied the seroprevalence of students and their household members in the region of Oise, where SARS-CoV-2 was introduced early on in the epidemic, before school closures. Although the attack rate in primary school children was relatively low and the retrospective design makes it impossible to establish with certainty who infected who in the household, children did seem to be able to pass on the infection to their household members: the infection attack rate was 61% in parents of infected pupils as compared to 6.9% in parents of non-infected pupils (30). Child-to-adult transmission within households cannot be compared to child-to-adult transmission within schools, as is shown by data from Sweden. Primary schools in Sweden remained open, but infection amongst teachers was not higher than in other professions (31).
Finally, during a large outbreak in a secondary school in Israel, 153 infected students and 25 infected staff members passed on the infection to relatives and friends, to amount to a total of 260 infected individuals (including staff and students) linked to the outbreak (32).

5.3. TRANSMISSION IN SCHOOL SETTINGS/YOUTH GATHERINGS

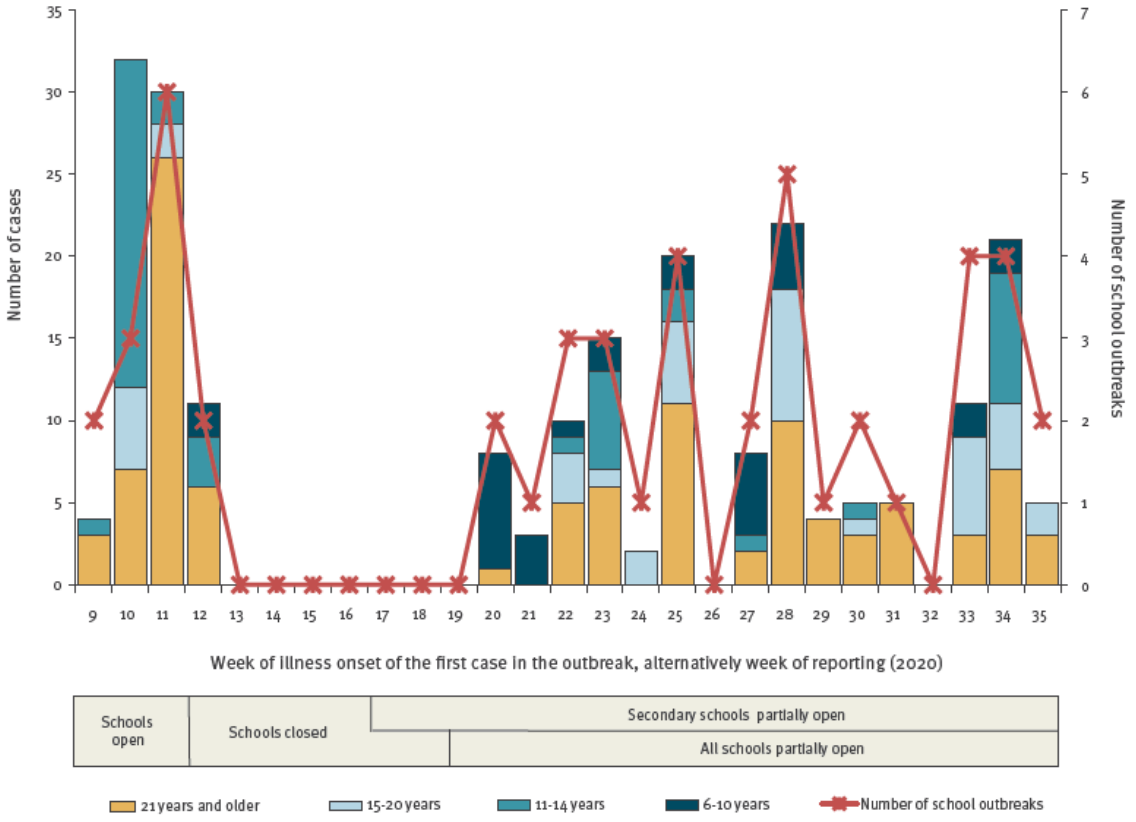
Contact tracing and cluster investigations in schools before lockdown done in Ireland (33), France (34) and New South Wales (35) reported very limited onwards transmission. A comparison between Finland, where primary schools closed, and Sweden, where primary schools remained open, did not show any measurable impact of the school closure on the number of laboratory-confirmed cases in children (31). Beginning of August, ECDC published a risk assessment on COVID-19 in children and the role of school settings in COVID-19 transmission and concluded that “Investigations of cases identified in school settings suggest that **child to child transmission in schools is uncommon and not the primary cause of SARS-CoV-2 infection in children** whose onset of infection coincides with the period during which they are attending school, particularly in preschools and primary schools.” (36)

Secondary schools seem at higher risk for outbreaks than primary schools: despite introduction of the virus in both a high school and a primary school in the French region of Oise, the infection attack rate was estimated at 8.8% in primary school students compared to 38.3% in the high school students (30,37). That high schools present a higher risk of transmission is supported by the report of a large outbreak in a high school in Israel (32). In the school in Israel, several risk factors for transmission were reported: classes were crowded (35–38 students per class), distancing among students and between

students and teachers was not possible, an exemption of mask use was made during the heat wave and there was continuous use of air-conditioning. Cluster investigations in Germany showed that school outbreaks occurred in primary as well as secondary schools, despite low incidence. They found some evidence that transmission did occur within a school and case numbers were higher in older age groups (38). This is in line with findings from the UK, where 30 school outbreaks before the summer holidays were analyzed (39). The authors conclude that "overall, infections and outbreaks were uncommon across all educational settings." The majority of outbreaks was linked to staff (staff-to-staff n=15, staff-to-student n=7 vs. student-to-staff n=6 and student-to-student n=2). The risk of outbreaks was linked to the level of community transmission and outbreaks were more common in secondary schools. Finally, Macartney and colleagues reported data from Australian educational settings where 25 schools/facilities had children (n=12) or adults (n=15) attend while infectious, with 1448 contacts monitored. Secondary transmission occurred in only four settings, but one outbreak involved transmission to six adults and seven children. Risk of transmission was much higher when a member of staff was the index case (SAR 15/669 = 2%) than when a child was the index case (SAR 3/752 = 0.4%). Moreover, despite only 10% of the school attendees being staff, primary COVID-cases were staff members in 56% of educational settings (40).

FIGURE

Number of school outbreaks (n = 48) and number of laboratory-confirmed COVID-19 cases (n = 216) by age and week of illness onset of the first case in the outbreak, Germany, 28 January–31 August 2020



Source: Kampe et al (38)

Risk of transmission seems also dependent on the setting and can be (much) higher during youth gatherings/overnight camps. During an overnight youth camp in Georgia with 590 young participants (aged 6 to 21 years) and 7 staff members (22+), high attack rates were noted in all age groups, including those 6 to 10 years old, after a teenage staff member was confirmed with COVID-19 during the camp. Out of 344 people tested, 76% had a positive result. Of note is that there were indoor activities organized without extra ventilation of the rooms, there was a lot of loud singing, shouting and

cheering and given the increasing incidence of COVID-19 in Georgia in June and July, some cases might have resulted from transmission occurring before or after camp attendance (29).

5.4. EFFECTIVENESS OF MASK USE IN CHILDREN

The effectiveness of mask use is generally accepted for adults. Younger children might however not be able to correctly use the mask. The WHO recommendation on use of masks in children (41) discusses the (limited) available evidence of use of masks in children:

"*Evidence on the benefits and harms of children wearing masks to mitigate transmission of COVID-19 and other coronaviruses is limited. However, some studies have evaluated the effectiveness of mask use in children for influenza and other respiratory viruses[30-34]. A study of mask wearing during seasonal influenza outbreaks in Japan noted that* ***the use of masks was more effective in higher school grades (9-12 year old children in grades 4-6) than lower grades (6-9 year old children, in grades 1-3)***[34]*. One study, conducted under laboratory conditions and using non-betacoronaviruses, suggested that children between five and 11 years old were significantly less protected by mask wearing compared to adults, possibly related to inferior fit of the mask[35]. Other studies found evidence of some protective effect for influenza for both source control[30] and protection in children[34], although* ***overall compliance with consistent mask wearing, especially among children under the age of 15, was poor****.*

Some studies, including studies conducted in the context of influenza and air pollution, found the ***use and acceptability of mask wearing to be highly variable among children****, ranging from very low to acceptable levels and decreasing over time while wearing masks[30,31,33,36-38]. One study was carried out among primary school children during COVID-19 and reported 51.6% compliance[31].*

*Several studies found that factors such as warmth, irritation, breathing difficulties, discomfort, distraction, low social acceptability and poor mask fit were reported by children when using masks[30,33,36,37]. So far, the effectiveness and impact of masks for children during play and physical activity have not been studied; however, a study in adults found that N95 respirator and surgical masks reduced cardiopulmonary capacity during heavy exertion[39].****"***

6. International recommendations on masks in children

6.1. WHO (41)

WHO and UNICEF advise that the decision to use masks for children aged 6-11 should be based on a risk-based approach. This approach should take into consideration:

- intensity of transmission in the area where the child is and updated data/available evidence on the risk of infection and transmission in this age group;
- social and cultural environment such as beliefs, customs, behaviour or social norms that influence the community and population's social interactions, especially with and among children;
- the child's capacity to comply with the appropriate use of masks and availability of appropriate adult supervision;
- potential impact of mask wearing on learning and psychosocial development; and
- additional specific considerations and adaptions for specific settings such as households with elderly relatives, schools, during sport activities or for children with disabilities or with underlying diseases.

6.2. ECDC

"Within the community the use of face masks is recommended in indoor settings when it is not possible to maintain physical distancing. However, in school settings, implementing this measure is challenging, as it is known that children have a lower tolerance to wearing masks for extended periods of time, and may fail to use the masks properly.

In primary schools, the use of face masks is recommended for teachers and other adults when physical distancing cannot be guaranteed, although it is not recommended for the students. In secondary schools, the use of face masks is recommended for both students and adults. The use of masks should be seen as a complementary measure, rather than a single measure to prevent transmission within schools.

Physical distancing, safe coughing etiquette, hand hygiene, and staying at home when ill are all still important measures for reducing infection, irrespective of whether masks are being used within schools."

6.3. CDC

Appropriate and consistent use of masks may be challenging for some students, teachers, and staff, including:

- Younger students, such as those in early elementary schoo
- Students, teachers, and staff with severe asthma or other breathing difficulties

Possible Student Scenario	Masks Recommended	Masks May Be Considered	Additional Considerations
Students are seated less than 6 feet apart while riding a bus or while carpooling	✓		• Masks should always be worn by bus and carpool drivers as able*
Students are less than 6 feet apart while entering or exiting school (e.g., carpool drop off/pick up) or while transitioning to/from other activities	✓		• Consider having staff monitor students during transitions to encourage correct use and distribute masks as needed. • Teachers and staff should wash or sanitize hands (using a hand sanitizer that contains at least 60% alcohol) before and after helping a student put on or adjust a mask.
Students are seated **at least** 6 feet apart in the classroom		✓	• Adaptations and alternatives should be considered whenever possible to increase the feasibility of wearing a mask or to reduce the risk of COVID-19 spreading.
Students are seated **less than** 6 feet apart in the classroom, or are engaging in learning stations or circle time that require close contact	✓		• Schools may consider keeping students in "cohorts." Cohorts are groups of students that do not mix with other cohorts/groups of students throughout the school day. • Adaptations and alternatives should be considered whenever possible to increase the feasibility of wearing a mask or to reduce the risk of COVID-19 spreading.
Students are less than 6 feet apart while transitioning between classes or to other activities during the school day	✓		• Schools may consider staggering classroom transition times and allow only one-way pathways/hallways. • Adaptations and alternatives should be considered whenever possible to increase the feasibility of wearing a mask or to reduce the risk of COVID-19 spreading.

6.4. OTHER EUROPEAN COUNTRIES

Country	Age	Class/School	Source/Extra info
France	Age 6	Yes, closed spaces and exterior	https://www.education.gouv.fr/media/71258/download
Spain	Age 6	Yes, regardless of distance	https://portaldogc.gencat.cat/utilsEADOP/PDF/8173/1803867.pdf
Portugal	Age 10	Yes, in class and playground	
Italy	Age 6	Only if distance <1m	
Greece	Age 3	?	https://www.tornosnews.gr/en/greek-news/41123-mandatory-use-of-face-masks-in-all-indoor-public-places-in-greece.html
The Netherlands	Age 12	Only outside classroom	https://www.rijksoverheid.nl/onderwerpen/coronavirus-covid-19/openbaar-en-dagelijks-leven/mondkapjes/onderwijs
Germany	Most 'länder' age 10/11	Only when not seated in class	https://www.dw.com/en/coronavirus-germanys-new-face-mask-regulations-explained/a-53260732#:~:text=Who%20is%20required%20to%20wear,stores%20and%20on%20public%20transportation
Austria	Age 6	Only in common parts of building, not once seated in class	
Ireland	Not adviced < 13 in public schools	≥13 in class, not for exterior activities with distance 2m	Some international or private schools advice masks in children <13 https://www.citizensinformation.ie/en/health/covid19/face_coverings_during_covid19.html#l06d1d
Norway	Not in children	No	
Finland		Not explicitly advised, only minority of children wears masks	Masks in general not mandatory, only advised in crowded spaces
Sweden		No	
Denmark	Age 15 (in practice age 12)	Only in common parts of building, not once seated in class	
Switzerland	Age 12	Yes, in face to face activities	https://www.newsd.admin.ch/newsd/message/attachments/63495.pdf

UK	Age 11 (England, Wales, Northern Ireland) Age 5 Scotland	Strongly recommended in common parts of building where no 2m distance possible (not in class and outside).	https://www.gov.uk/government/publications/face-coverings-in-education/face-coverings-in-education
Luxemburg	Age 6	Age 6: inside building, facultative in class and playground Age 12: mandatory in playground (in class depending on the school)	https://sante.public.lu/fr/espace-professionnel/recommandations/direction-sante/000-covid-19/000-covid-191-annexes/recommandations-sanitaires-cycles-1-4.pdf
Croatia	Age 10	Yes, inside, not on playground	
Poland	No age limit	Depending on the school	
Hungary	?	Recommended in 'gatherings' and where distance of 1.5 meter not possible	
Romania	Age 5	Yes, in class and playground	
Estonia		Not explicitly advised, only minority of children wears masks	Masks in general not mandatory, only advised in crowded spaces
Latvia	Age 12	Not in elementary school	
Lithuania	Age 6	No	https://koronastop.lrv.lt/en/news/covid-19-related-restrictions-updated-on-5-november-2020
Malta	Age 3	Yes, at all moments	
Bulgaria	'all pupils and students'	Yes, common parts of the building (hall, stairway etc.)	
Czechia	Age 6	Elementary school: playground, secondary school: in class.	NB school are closed
Slovakia			
Slovenia			

The following experts contributed to this advice:

Frédérique Jacobs (ULB), Frédérique Frippiat (CHU Liège/AVIQ), Naïma Hammami (Agentschap Zorg & Gezondheid), Germaine Hanquet (KCE), Nathalie Ribesse (ONE), Nicolas Franco (Université Namur), Petra Schelstraete (UZ Gent, Pediatric COVID-19 Task Force), Pierre Smeesters (Hôpital Universitaire des Enfants Reine Fabiola, Pediatric COVID-19 Task Force), Tinne Lernout (Sciensano), Valeska Laisnez (Sciensano), Pierre-Louis Deudon (COCOM), Pierrette Melin (Université Liège), Steven Van Gucht (Sciensano), Delphine Jacobs (UC Louvain, Pediatric COVID-19 Task Force), Stefan Teughels (Voorzitter Wachtposten Vlaanderen), Koen Vanden Driessche (UZA, Pediatric COVID-19 Task Force), Michèle Pommé (Deutschsprachige Gemeinschaft), Yves Van Laethem (ULB, Conseil Supérieur de la Santé), Steven Callens (UGent), Diane Stroobant (Grand Hôpital de Charleroi), Emmanuel André (NRC), Geert Molenberghs (KU Leuven/U Hasselt), Bram Bloemen (data analyse, Sciensano), Kristiaan Proesmans (data analyse, Sciensano), Laura Cornelissen (Sciensano).

REFERENCES

1. COVID-19 Rapid Evidence Service | National Collaborating Centre for Methods and Tools. Rapid Review Update 9: What is the specific role of daycares and schools in COVID-19 transmission [Internet]. 2020 [cited 2020 Nov 5]. Available from: https://www.nccmt.ca/covid-19/covid-19-rapid-evidence-service

2. American Academy of Pediatrics, Children's Hospital Association. Children and COVID-19: State-Level Data Report [Internet]. [cited 2020 Nov 5]. Available from: http://services.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/children-and-covid-19-state-level-data-report/

3. Gudbjartsson DF, Helgason A, Jonsson H, Magnusson OT, Melsted P, Norddahl GL, et al. Spread of SARS-CoV-2 in the Icelandic Population. N Engl J Med. 2020 Apr 14;NEJMoa2006100.

4. Lavezzo E, Franchin E, Ciavarella C, Cuomo-Dannenburg G, Barzon L, Del Vecchio C, et al. Suppression of a SARS-CoV-2 outbreak in the Italian municipality of Vo'. Nature. 2020 Jun 30;1–5.

5. Stringhini S, Wisniak A, Piumatti G, Azman AS, Lauer SA, Baysson H, et al. Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study. The Lancet. 2020 Aug;396(10247):313–9.

6. Pollán M, Pérez-Gómez B, Pastor-Barriuso R, Oteo J, Hernán MA, Pérez-Olmeda M, et al. Prevalence of SARS-CoV-2 in Spain (ENE-COVID): a nationwide, population-based seroepidemiological study. The Lancet [Internet]. 2020 Jul 6 [cited 2020 Jul 31];0(0). Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31483-5/abstract

7. Li X, Xu W, Dozier M, He Y, Kirolos A, Theodoratou E. The role of children in transmission of SARS-CoV-2: A rapid review. J Glob Health [Internet]. [cited 2020 Jul 26];10(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7323934/

8. Davies NG, Klepac P, Liu Y, Prem K, Jit M, Eggo RM. Age-dependent effects in the transmission and control of COVID-19 epidemics. Nat Med. 2020 Jun 16;1–7.

9. Mizumoto K, Omori R, Nishiura H. Age specificity of cases and attack rate of novel coronavirus disease (COVID-19). medRxiv. 2020 Mar 13;2020.03.09.20033142.

10. Zhang J, Litvinova M, Liang Y, Wang Y, Wang W, Zhao S, et al. Changes in contact patterns shape the dynamics of the COVID-19 outbreak in China. Science [Internet]. 2020 Apr 29 [cited 2020 May 15]; Available from: https://science.sciencemag.org/content/early/2020/05/04/science.abb8001

11. Roland AM& D. The missing link? Children and transmission of SARS-CoV-2. Dont Forget Bubbles [Internet]. 2020 May 5 [cited 2020 Jul 31]; Available from: ://dontforgetthebubbles.com//the-missing-link-children-and-transmission-of-sars-cov-2/

12. Viner RM, Mytton OT, Bonell C, Melendez-Torres GJ, Ward J, Hudson L, et al. Susceptibility to SARS-CoV-2 Infection Among Children and Adolescents Compared With Adults: A Systematic Review and Meta-analysis. JAMA Pediatr [Internet]. 2020 Sep 25 [cited 2020 Sep 28]; Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2771181

13. Somekh E, Gleyzer A, Heller E, Lopian M, Kashani-Ligumski L, Czeiger S, et al. The Role of Children in the Dynamics of Intra Family Coronavirus 2019 Spread in Densely Populated Area. Pediatr Infect Dis J. 2020 Aug;39(8):e202.

14. Mizumoto K, Omori R, Nishiura H. Age specificity of cases and attack rate of novel coronavirus disease (COVID-19) [Internet]. Infectious Diseases (except HIV/AIDS); 2020 Mar [cited 2020 Mar 31]. Available from: http://medrxiv.org/lookup/doi/10.1101/2020.03.09.20033142

15. Lee P-I, Hu Y-L, Chen P-Y, Huang Y-C, Hsueh P-R. Are children less susceptible to COVID-19? J Microbiol Immunol Infect [Internet]. 2020 Feb 25 [cited 2020 Mar 11]; Available from: http://www.sciencedirect.com/science/article/pii/S1684118220300396

16. Koh WC, Naing L, Chaw L, Rosledzana MA, Alikhan MF, Jamaludin SA, et al. What do we know about SARS-CoV-2 transmission? A systematic review and meta-analysis of the secondary attack rate and associated risk factors. PLOS ONE. 2020 Oct 8;15(10):e0240205.

17. L'Huillier AG, Torriani G, Pigny F, Kaiser L, Eckerle I. Shedding of infectious SARS-CoV-2 in symptomatic neonates, children and adolescents [Internet]. Infectious Diseases (except HIV/AIDS); 2020 May [cited 2020 Jun 5]. Available from: http://medrxiv.org/lookup/doi/10.1101/2020.04.27.20076778

18. Jones TC, Mühlemann B, Veith T, Zuchowski M, Hofmann J, Stein A, et al. An analysis of SARS-CoV-2 viral load by patient age. :19.

19. Yonker LM, Neilan AM, Bartsch Y, Patel AB, Regan J, Arya P, et al. Pediatric SARS-CoV-2: Clinical Presentation, Infectivity, and Immune Responses. J Pediatr [Internet]. 2020 Aug 19 [cited 2020 Sep 2];0(0). Available from: https://www.jpeds.com/article/S0022-3476(20)31023-4/abstract

20. Heald-Sargent T, Muller WJ, Zheng X, Rippe J, Patel AB, Kociolek LK. Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Levels in Patients With Mild to Moderate Coronavirus Disease 2019 (COVID-19). JAMA Pediatr [Internet]. 2020 Jul 30 [cited 2020 Jul 31]; Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2768952

21. Zhu Y, Bloxham CJ, Hulme KD, Sinclair JE, Tong ZWM, Steele LE, et al. Children are unlikely to have been the primary source of household SARS-CoV-2 infections. medRxiv. 2020 Mar 30;2020.03.26.20044826.

22. Posfay-Barbe KM, Wagner N, Gauthey M, Moussaoui D, Loevy N, Diana A, et al. COVID-19 in Children and the Dynamics of Infection in Families. Pediatrics. 2020 Aug;146(2):e20201576.

23. Hyde Z. COVID-19, children, and schools: overlooked and at risk. Med J Aust. 2020 Aug 12;1.

24. 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 [Internet]. 2020 Oct 30 [cited 2020 Nov 5];69(44). Available from: http://www.cdc.gov/mmwr/volumes/69/wr/mm6944e1.htm?s_cid=mm6944e1_w

25. Buitrago-Garcia D, Egli-Gany D, Counotte MJ, Hossmann S, Imeri H, Ipekci AM, et al. Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: A living systematic review and meta-analysis. PLOS Med. 2020 Sep 22;17(9):e1003346.

26. Han MS, Choi EH, Chang SH, Jin B-L, Lee EJ, Kim BN, et al. Clinical Characteristics and Viral RNA Detection in Children With Coronavirus Disease 2019 in the Republic of Korea. JAMA Pediatr [Internet]. 2020 Aug 28 [cited 2020 Sep 2]; Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2770150

27. Lopez AS, Hill M, Antezano J, Vilven D, Rutner T, Bogdanow L, et al. Transmission Dynamics of COVID-19 Outbreaks Associated with Child Care Facilities — Salt Lake City, Utah, April–July 2020. MMWR Morb Mortal Wkly Rep [Internet]. 2020 Sep 11 [cited 2020 Sep 14];69(37). Available from: http://www.cdc.gov/mmwr/volumes/69/wr/mm6937e3.htm?s_cid=mm6937e3_w

28. Okarska-Napierała M, Mańdziuk J, Kuchar E. Early Release - SARS-CoV-2 Cluster in Nursery, Poland - Volume 27, Number 1—January 2021 - Emerging Infectious Diseases journal - CDC. [cited 2020 Nov 5]; Available from: https://wwwnc.cdc.gov/eid/article/27/1/20-3849_article

29. Gilliam WS, Malik AA, Shafiq M, Klotz M, Reyes C, Humphries JE, et al. COVID-19 Transmission in US Child Care Programs. Pediatrics [Internet]. 2020 Oct 1 [cited 2020 Nov 5]; Available from: https://pediatrics.aappublications.org/content/early/2020/10/16/peds.2020-031971

30. Fontanet A, Grant R, Tondeur L, Madec Y, Grzelak L, Cailleau I, et al. SARS-CoV-2 infection in primary schools in northern France: A retrospective cohort study in an area of high transmission. medRxiv. 2020 Jun 29;2020.06.25.20140178.

31. Public Health Agency of Sweden. Covid-19 in schoolchildren. A comparison between Finland and Sweden [Internet]. Report No.: 20108–1. Available from: www.folkhalsomyndigheten.se/publicerat-material/

32. Stein-Zamir C, Abramson N, Shoob H, Libal E, Bitan M, Cardash T, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. Eurosurveillance [Internet]. 2020 Jul 23 [cited 2020 Jul 26];25(29). Available from: https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.29.2001352

33. Heavey L, Casey G, Kelly C, Kelly D, McDarby G. No evidence of secondary transmission of COVID-19 from children attending school in Ireland, 2020. Eurosurveillance. 2020 May 28;25(21):2000903.

34. Danis K, Epaulard O, Bénet T, Gaymard A, Campoy S, Bothelo-Nevers E, et al. Cluster of coronavirus disease 2019 (Covid-19) in the French Alps, 2020. Clin Infect Dis [Internet]. [cited 2020 Apr 27]; Available from: https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciaa424/5819060

35. National Centre for Immunisation Research and Surveillance. COVID-19 in schools - the experience in NSW [Internet]. 2020 Apr [cited 2020 Jul 28]. Available from: http://ncirs.org.au/sites/default/files/2020-04/NCIRS%20NSW%20Schools%20COVID_Summary_FINAL%20public_26%20April%202020.pdf

36. European Centres for Disease Control. COVID-19 in children and the role of school settings in COVID-19 transmission [Internet]. Stockholm; 2020 Aug [cited 2020 Nov 10]. Available from: https://www.ecdc.europa.eu/en/publications-data/children-and-school-settings-covid-19-transmission

37. Fontanet A, Tondeur L, Madec Y, Grant R, Besombes C, Jolly N, et al. Cluster of COVID-19 in northern France: A retrospective closed cohort study. medRxiv. 2020 Apr 23;2020.04.18.20071134.

38. Kampe EO im, Lehfeld A-S, Buda S, Buchholz U, Haas W. Surveillance of COVID-19 school outbreaks, Germany, March to August 2020. Eurosurveillance. 2020 Sep 24;25(38):2001645.

39. Sharif AI, Saliba V, Bernal JL, Ramsay ME, Ladhani SN. SARS-CoV-2 infection and transmission in educational settings: cross-sectional analysis of clusters and outbreaks in England. :28.

40. Macartney K, Quinn HE, Pillsbury AJ, Koirala A, Deng L, Winkler N, et al. Transmission of SARS-CoV-2 in Australian educational settings: a prospective cohort study. Lancet Child Adolesc Health [Internet]. 2020 Aug 3 [cited 2020 Aug 17]; Available from: http://www.sciencedirect.com/science/article/pii/S2352464220302510

41. World Health Organization. Advice on the use of masks for children in the community in the context of COVID-19 [Internet]. 2020 [cited 2020 Nov 6]. Available from: https://www.who.int/publications-detail-redirect/WHO-2019-nCoV-IPC_Masks-Children-2020.1