



# COVID-19 and re-opening of schools: Opinions with scientific evidence

COVID-19 ve okulların açılması: Bilimsel kanıtlar eşliğinde görüşler

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## Abstract

Due to the COVID-19 pandemic, more than 90% of students worldwide were affected by education loss. Moreover, for school-age children and adolescents, there may be worsening of nutrition, increasing mental health disorders, lack of physical activity, and related deleterious consequences raise concerns about negative habits, child violence, and abuse. Face-to-face education in schools provides positive educational opportunities that cannot be achieved with online education. In studies from various countries, children have milder disease, constituting as little as 1–8% of all laboratory-confirmed COVID-19 cases, with less transmission capacity to household contacts than adults (0.5–7% vs. 10–20%). Symptomatic or asymptomatic children can infect other people less than adults. Also, the transmission of illness between students at school is less than expected, and the transmission of COVID-19 to students is usually acquired from sick adults rather than sick students. Therefore, with suitable measures, infection risk is less than expected and seems not to be higher than in other public places. COVID-19 measures in schools can be summarized as follows: avoiding crowded/close contact environments as much as possible, respecting the protective (social) distance, wearing appropriate masks, hand hygiene, and some essential protective measurements of classrooms and environment. Measurements should be participatory (students, teachers, education staff, parents, administration), applicable, sustainable, and flexible according to the conditions.

**Keywords:** Children; COVID-19; school; school re-opening; student

## Öz

COVID-19 pandemisine bağlı olarak dünya genelinde öğrencilerin %90'ından fazlası öğrenme kaybından etkilenmiştir. Ayrıca, okul yaşındaki çocuklar ve ergenler açısından, beslenmede kötüleşme, artan ruh sağlığı bozuklukları, fiziksel aktivite eksikliği ve buna bağlı olumsuz sonuçlar ortaya çıkabilir ve bu durum, olumsuz alışkanlıklar, çocuğa şiddet ve çocuk istismarı konularında endişeler yaratmaktadır. Okullarda yüz yüze eğitim, on-line eğitimle elde edilemeyecek olumlu eğitim olanakları sağlar. Çeşitli ülkelerde yapılan çalışmalarda, çocuklarda daha hafif hastalık bildirilmiştir, çocuklar tüm laboratuvar onaylı COVID-19 olgularının %1–8 kadar küçük bir bölümünü oluşturmaktadır ve erişkinlere göre enfeksiyonu ev içi temaslılara bulaştırma kapasiteleri daha düşüktür (%10–20'e karşılık %0.5–7). Erişkinlerle karşılaştırıldığında, semptomatik ve asemptomatik çocuklar, diğer kişileri daha düşük oranda enfekte ederler. Ayrıca, hastalığın okulda öğrenciler arasında bulaşması, beklenenden daha düşük düzeydedir ve COVID-19, öğrencilere genellikle hasta öğrencilerden çok, hasta erişkinlerden geçmektedir. Bu nedenle, uygun önlemler alındığında, okulda enfeksiyon riski beklenenden daha düşüktür ve diğer kamusal alanlara göre daha yüksek görünmemektedir. Okullarda COVID-19 ile ilgili alınacak önlemler şu şekilde özetlenebilir: Kalabalık/yakın temas ortamlarından mümkün olduğu kadar kaçınmak, koruyucu (sosyal) mesafeye uymak, uygun maske takmak, el hijyeni, sınıflarda ve okul ortamında bazı temel koruyucu önlemleri uygulamak. Önlemler katılımcı (öğrenciler, öğretmenler, eğitim personeli, ebeveynler, okul yönetimi), uygulanabilir, sürdürülebilir ve koşullara göre esnek olmalıdır.

**Anahtar sözcükler:** Çocuklar; COVID-19; okul; okulların yeniden açılması; öğrenci

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## Introduction

According to the Turkish Language Institution, school is defined as the place where various degrees of collective education, from teaching to learning reading and writing, and the highest level of science and art knowledge is given. The Turkish Standards Institute defines 'school' as buildings and facilities where children, young people, and adults receive education in order to lead a healthier, longer, more comfortable and more productive life (1). In our country, according to the data of the Ministry of National Education, there were 66 849 schools, 18 108 860 students, 1 077 307 teachers, and also school employees for the 2018–19 period (2).

In Turkey, after the first COVID-19 patient announcement of March 11<sup>th</sup>, 2020, on March 16<sup>th</sup>, 2020 face-to-face education in schools was interrupted and it was decided to complete the education online in all levels of education (2). Apart from families, more than 20 million students, teachers, school staff and ancillary services were affected by this decision. A similar situation has been the case for many countries of the world. The frightening onset of the pandemic, the thought that children could be severely affected by this disease, as in respiratory tract diseases such as influenza, and the risk that they could also play an important role in epidemic were the main influencers in the school closure decisions. The United Nations Educational, Scientific and Cultural Organization (UNESCO) stated that at least 177 countries implemented school closures at the national level, and some other countries practiced school closures at regional or local levels (3). In this article, the re-opening/closure of schools will be evaluated in terms of education and COVID-19 infection characteristics in children. In this article, 'the re-opening of schools' is used to mean students starting face-to-face education at school.

**Influencing education by the pandemic and risk assessment:** The COVID-19 pandemic has caused serious education losses worldwide due to school closures. More than 90% of students worldwide (more than 1.5 billion students) were affected by education loss. In this context, COVID-19's education loss for school-age children and adolescents takes the forms of worse nutrition, increasing mental health disorders, lack of physical activity, and possibly developing negative habits due to being in out-of-school environments. In some age groups, it can cause anxiety in terms of child violence and abuse, which is more common in some societies (4, 5). For example, in a developed Western country, Italy, 9 040 000 children and young people in kindergartens and early childhood education services have been out of school during the COVID 19 pandemic. It was shown that 42% of these chil-

dren lived in overcrowded houses, 12% in poverty, and 7% in home environments at higher risk of abuse (6).

The re-opening of schools may cause an increase in the risk of some respiratory infections in both children and adults. The best-known and best-documented infection is influenza (flu). However, different infectious diseases may not share the same characteristics. Concerning the COVID-19 infection, there are limited studies on whether the COVID-19 rates increase open schools or with re-opening of schools, either in schools or the community due to the opened school. In different countries around the world, there have been some different practices for the re-opening of schools and their results have been documented. When the pandemic started in the early period of 2020 in Denmark and Finland, schools were first closed and then re-opened. After the opening of schools, there was no change in the number of cases in school-age children (<16 years), the disease rates in the community were not affected by the re-opening of schools, and the expected increase in infections did not occur. There was also no difference in COVID-19 disease rates compared with Sweden where schools never closed, and in Finland, which initially closed and then re-opened schools (7, 8). However, it should be kept in mind that these countries have a good and established education system. Also, the number of students in schools in these countries is less than in many countries, and they usually have better planning capacity at the social and school level in terms of the prevention of COVID-19 disease. In Israel, an increase in the rate of cases was observed in high school students after schools were re-opened, probably due to insufficient protective measures (9).

Deciding how to open schools and/or if they should open during the pandemic process is a difficult decision that requires multi-directional thinking. In this decision process, additional partners should make contributions as to who will respond to various problems, especially education and health perspectives. Pediatricians (pediatric infectious disease specialists in the case of infectious diseases area) are more concerned with health problems related to school and school-age children than other medical branches and also have a greater sense of responsibility. Face-to-face education at school is the preferred method of knowledge transfer to students. It also provides for the psycho-social maturation of students. Pediatricians are aware of the importance of face-to-face education in schools, which is more than just educational tools. Schools are educational and development environments where social and emotional abilities are gained besides education, social equality is ensured more among children than in out-of-school environments, healthier food

intake, exercise and sports opportunities are provided, and they are considered safer places than out-of-school environments. Face-to-face education environments in schools provide positive educational opportunities that cannot be achieved with online out-of-school education. Even in well-resourced families, a lack of teacher authority can cause problems for children to focus on lessons. In addition, staying in front of the computer for a long time can cause some additional health problems. It should be kept in mind that children who are economically deprived will have more difficulties in accessing online education (such as the lack of the availability of a computer suitable for education, uninterrupted internet problems, difficulties in concentrating in the crowded home environment). Even in the United States of America (USA), it has been shown that approximately one-fifth of secondary and high school students cannot connect to the internet for online education at home for these reasons (10). It has also been shown that students who are away from school, especially during adolescence, have an increased risk of being in undesired environments, developing harmful habits and friendships, and becoming more vulnerable to violence and abuse when parents cannot sufficiently care for various reasons (2, 10–12).

For children who are absent from school for a long time, especially in the first years of primary school, the development of withdrawal from school and adaptation difficulties can create significant problems. Working parents who plan their lives according to their children's schools may experience additional difficulties due to their children not attending school, which can create social, psychological, and professional problems. Working families have generally adjusted their economic plans and programs taking into account that their children receive the best education in open schools. Failure of these plans may cause additional stress and problems that were not previously considered. Some of these problems are the need of at-risk (usually elderly) grandparents to care for their children at home, the need of extra childminders who may have to use crowded public transport systems during rush hours, the necessity of leaving children with their neighbors or leaving children alone at home.

It is known that re-opening schools can predispose to many respiratory infections (such as influenza) in children. This is especially true in colder seasons when the schools are open and in crowded and poorly ventilated environments. However, COVID-19 has different epidemiologic characteristics from influenza. Influenza tends to be transmitted mainly from children to adults and therefore cause epidemics, COVID-19 tends to be transmitted from adults to adults, or from adults to chil-

dren. In COVID-19, currently, both the lack of effective vaccines and the lack of definite effective medicines in the world increases the risk. Also, COVID-19 differs from other respiratory diseases because the immune response in the population has not yet developed, and therefore the risk of epidemics is still very high. During the winter months, influenza and similar diseases, which are common in children, often present with symptoms such as fever, cough, sore throat, and headache. These symptoms are also the main findings of COVID-19. Therefore, an increase in probable COVID-19 cases can be expected in the coming winter months. To reduce this risk, it will be very important for all children, teachers, and school staff (such as everyone 6 months and older) to receive flu vaccines this year. Another point is that COVID-19 preventive measures (such as masks, distancing, staying away from crowded environments, hand hygiene) will also be protective against other respiratory infections transmitted by droplets. This will contribute positively to the reduction of COVID-19, as well as many other respiratory tract infections both in children and adults.

**Is COVID-19 infection common in children?** Children of all ages can get COVID-19 infection. However, unlike many other respiratory tract infections, the disease tends to be both less common and less severe in children than adults. According to the age groups, there may be differences in children being affected by the disease. In surveillance studies conducted in various countries around the world, it has been determined that children constitute only 1–8% of laboratory-proven (confirmed) COVID-19 cases (13). In the USA, approximately 8–9% of the confirmed cases reported to the Centers for Disease Control and Prevention (CDC), consisted of children aged under 18 years (14, 15). In the early stages of the pandemic in China, in February 2020, approximately 2% of those diagnosed with COVID-19 were children (<18 years). Again in the USA, in May 2020, in the first 4 months of the pandemic, about 5% of all confirmed cases were younger than 18 years and 1.5% less than 9 years (16–18). Likewise, in studies conducted in South Korea, Iceland, Italy, Japan, and also China, the rate of confirmed cases of COVID-19 disease in children was very low compared with the general population (19). There is a similar situation in other countries (13, 20). In a detailed review, severe clinical picture was observed with a lower rate in children compared with adults. More than 90% of all pediatric cases were found to be asymptomatic or have mild or moderate symptoms, and severe cases were most commonly found in the 0–1 year age group. In children, the possibility of a severe clinical picture is higher in those with underlying comorbidities and immunosuppression, and also in the younger pediatric age group (13, 20). In a meta-analysis,

of the confirmed cases, only 2% of children had severe COVID-19 disease (average 15% in adults), 0.7% of pediatric cases had critical disease requiring intensive care (5% in adults). The mortality rate in children was 0.08% (20). In Turkey, from March 11<sup>th</sup> to July 26<sup>th</sup>, of 227 107 confirmed cases (PCR+), 7.2% were aged under 15 years, and 13.9% were aged between 15–24 years (7). Taking into account these data, the rate of pediatric cases in our country seems to be slightly higher than world rates. During that period, in Turkey, 0.2% of all confirmed COVID-19 deaths were seen in children younger than 15 years (7).

Briefly, regarding the evidence-based data, we can say that the possibility of children getting COVID-19, especially those aged <10 years, was found to be much lower than in adults.

**How are the rates of transmission of COVID-19 disease in the home in children?** In general, infectious contact at home is one of the highest risks and transmission capacity. The limited studies in this topic revealed that the role of children in the transmission of COVID-19 to other people was less than that of adults. At home, after a person becomes ill, the rate of transmission to other people usually varies between 10–20%. In some cases (such as among the elderly or between spouses), this rate may increase even more (21, 22). In one study, the rate of secondary attacks caused by children in the home was found to be very low (0.5%) (22). In another study conducted in China, the secondary attack rate in children was approximately 5 times lower (OR 0.23) compared with those aged >60 years in the house. In addition, in family-borne outbreaks, it has been shown that the probability of children being index cases is only 5% (23). In another study, in family epidemics, children as index cases infected other household members in only 10% of cases (19). Again, retrospective studies on the transmission of COVID-19 conducted in China revealed a low (4–7%) disease secondary attack rate in people who came into contact with sick children at home (24, 25). In family clusters, more than 90% of children who became ill, got the disease after the contact with adult patients in the home (13). Evidence from current studies on the transmission at home shows that transmission from children to households is less than household adult-to-adults or from adults to children transmission (22, 26).

Briefly, the available evidence supports that transmission of the disease from children to adults is much lower in household contact situations, as well as lower rates of illness in children in the home. However, these studies must be interpreted with caution and can be misleading because some were conducted during situations such as the closure of children's schools, which would prevent

close contacts outside the home, and also at times when strict distance measures were in place (27).

**What is super contagious? Are children super contagious?**

Not all patients with COVID-19 have the same ability to infect other people. In some patients, the infective viral load and the capacity to infect others is very high. These are called super spreaders. It is estimated that approximately 80% of all COVID-19 cases in society are infected by only 20% of patients with high viral infectivity. Normally, a person with COVID-19 can infect an average of 2.5–3.5 people, whereas super-spreaders can infect dozens or even hundreds of people (22). The general opinion emerging from the literature is that children are generally not super-spreaders in terms of COVID-19.

The exact role of children in infecting others regarding COVID-19 disease is not clear because there are not enough comprehensive and well-planned studies. The available limited evidence suggests that transmission by children, particularly by young children, to others is rare. However, older children (aged >10 years) and adolescents can transmit COVID-19 similar to adults (9, 27–31). For this reason, some different approaches should be considered in the perspective of preventive measures according to age groups in young children and adolescents in schools.

**How do children get COVID-19?** Most children are infected through household contact, especially when an adult is the index case. In schools, there may be transmission to students from teachers or school staff. In addition, possible cases of transmission have been reported among students in schools (32, 33).

**Transmission by asymptomatic children:** There is little information about the transmission of SARS-CoV-2 to others from truly asymptomatic (not presymptomatic) children. Studies in familial clusters involving asymptomatic children and studies on possible transmission from asymptomatic children to adults suggest that asymptomatic children may have a role in transmitting the disease. However, it is well documented that asymptomatic adults can transmit the disease more commonly than children (13).

**Transmission in educational settings:** Limited evidence suggests that COVID-19 transmission from pre-adolescent symptomatic children is rare in educational settings, especially if there are few students in the classroom (7–9). Also, transmission by pre-symptomatic children and adolescents to others in educational settings was rare where effective control measures were employed (33, 34). During the first wave of the pandemic, in early 2020 in Aus-

tralia, most schools remained open. Twelve children with COVID-19 who continued their education in pre-school, primary or secondary school were identified and 752 contacts (649 children and 103 adults) were defined. In only 3 (<0.5%) contacts, secondary infections were identified (two children and one adult staff) (34). In different environments where students perform activities together such as in school and ski centers, COVID-19 transmission from infected children to other children and teachers was found as low. In these cases, it has been shown that transmission to other children is mainly caused by sick adults (19).

Briefly, the results of limited studies show that the transmission of COVID-19 between students in schools is lower than expected and the transmission of COVID-19 to students occurs mainly from sick adults rather than other sick students.

**Are there some considerations for certain risky students regarding COVID-19 infections?** School or pre-school age children usually have higher rates of respiratory tract infections, usually having similar clinical symptoms to COVID-19. Another point to be considered in school-age children is the frequency of respiratory tract co-infections as COVID-19 such as influenza, mycoplasma, cytomegalovirus, respiratory syncytial virus (20, 35). Therefore, children with respiratory tract infections should be advised not to come to school.

Students with underlying chronic diseases (e.g. cancer, diabetes, obesity, immunodeficiency, juvenile idiopathic arthritis, chronic lung diseases) are prone to more severe disease (20, 36). Thus, certain different and/or extra measures should be taken for students with underlying chronic conditions.

**Conclusion and comment:** Continuation of school education in developed countries is considered to be very important and essential. However, it is also essential to protect the health of students, teacher-educators, and other education personnel. These two approaches must be pursued together and in balance. These approaches must be implemented with pre-determined plans and in a controlled manner. The protection of well-trained teachers, especially in the risk group or above a certain age who are more likely to be affected by COVID-19 is as important as the prevention of disease in students. In a study conducted in the USA in 2018, it was found that more than 50% of teachers in all schools were aged 50 years or older (37). Also, a more specific approach to the vulnerable student population (such as those with disabilities, special education needs) will be required. For this reason, if the opening of schools comes to the agenda,

preventive conditions should be provided in schools. Preventive measures for students, teachers, and other education staff must be taken beforehand, they must be maintained steadily, and inspections and checks must be made at certain periods. The education to be given to students in schools may also contribute to the education of families through students. If the event that COVID-19 develops at school, which should be considered a reasonable possibility in pandemic conditions, the necessary medical and protective measures should be taken quickly. If an epidemic occurs in the school, and if it is difficult to control, the school may be closed temporarily or for a longer period, as a result of scientific evaluation. Likewise, in the spring season of 2020 in Germany, a few weeks after the schools were opened, an increase in the number of COVID-19 cases was observed in some schools, and two schools were temporarily closed. Schools in other regions continued their education by continuing with routine preventive measures (38). Depending on the conditions, decisions can be made for the continuation of education in different regions and schools. When necessary, hybrid training (face-to-face training plus distance-on-line training mix) can be used for a certain periods. However, these decisions must be made in a scientific and controlled manner, with flexibility that can vary according to the circumstances. In this respect, administrators should be prepared to adapt to different conditions, and regular training should be provided to students, teachers, and education staff in a transparent manner. The responsibility should also be shared with the awareness of the event. The gain of education is the gain of the country.

Some criteria that should be taken into account in the process of re-opening sectors during the pandemic conditions have been put forward by Johns Hopkins Bloomberg School of Public Health. These are the decrease in new cases in the last 14 days, the presence of sufficient and rapid diagnostic test capacity (for the patient and close contacts), the establishment of sufficient healthcare capacity for examination, treatment, and follow-up conditions for potential new cases and their contacts, and ensuring safe working conditions, including personal protective equipment for health personnel (39). Similar criteria can be adapted to schools before the decision to re-open. It should be ensured that the health system is sufficient and ready, a sufficient and rapid test system is established, and the minimum necessary protective measures are applied at every stage.

After the re-opening of schools, there could be an increase in other respiratory infections that may be confused with COVID 19. COVID-19 infections could also increase and administrators should be prepared accordingly. Preven-

tive measures applied consistently in the community and schools can contribute to the reduction of COVID-19 and other respiratory infections in children.

It is neither a scientific nor a rational approach to link the increase in the COVID-19 pandemic exclusively with the re-opening of schools with appropriate measures. For example, in Turkey, due to the pandemic, on March 16<sup>th</sup>, 2020, it was decided to close schools throughout the country. According to official data of the Ministry of Health, the total number of cases per day at the beginning of school closures was reported as 18 cases. Then, the daily case numbers across the country were 4801 on April 16<sup>th</sup>, 2020, 1610 on May 16<sup>th</sup>, 2020, 1467 on June 16<sup>th</sup>, 2020, 947 on July 16<sup>th</sup>, 2020, 1192 on August 16<sup>th</sup>, 2020, and 1771 on September 16<sup>th</sup>, 2020, respectively (40). After this pan-country closure of schools, the number of daily cases first increased, started to decrease in the summer season, and in September 2020, before the school re-opening (the schools partly re-opened on September 16<sup>th</sup>, 2020), compared with the July 2020 numbers, daily cases increased almost twice.

The thought that “Health comes before everything” cannot be denied. However, it can also not be denied that out-of-school and non-child factors play a very important role in the increase of COVID-19 cases during the period when schools are closed for a very long time, and even in the summer season when respiratory tract infections are relatively less expected.

COVID-19 measures in schools generally include staying away from crowded environments as much as possible; complying with preventive (social, personal) distancing; wearing appropriate masks; complying with hand, environment, and personal contact hygiene; and increasing these adaptations in all areas of life in the school. Sick students, teachers and education staff must contact the health system before coming to school, and then the necessary treatment, isolation and other regulations should be implemented for protection measures (18, 41). Thus, it should be aimed to prevent COVID-19 infection in schools, and if cases occur, prevent the infection from spreading or keep it to a minimum level. Measures should be participatory (such as students, teachers, education staff, parents, administration), applicable, decisively sustainable, and flexible according to the conditions.

It should be kept in mind that there may be differences in the practical applications of these measures in different schools and age groups. For example, it may not always be possible to wear a suitable mask in preschool and kindergarten by small children. In this case, it may be

more important to effectively ventilate the education environment (naturally, not with air-conditioning), to provide education in larger areas and to provide appropriate distancing, and to ensure frequent cleaning of the environment in the presence of children who cannot control their secretions. In adolescent students (age >10 years), contagiousness may be close to adults; therefore, wearing masks, obeying distancing rules and avoiding crowded environments should have greater emphasis. In this article, detailed protection measures in different educational settings and schools are not mentioned.

It is necessary to take the necessary precautions in order to open schools. Many countries have achieved this. Failure to take and maintain these preventive measures is the failure of the administration. It is recommended that governments around the world should encourage all children, even those with comorbid illnesses, to attend school by taking necessary measures (10, 18). Sara Sally Goza, the President of the American Academy of Pediatrics, stated that, as pediatricians, what children receive from school is much more than just education. Therefore, the necessary measures should be taken properly and face-to-face education should begin with students in schools (10). In the USA, the re-opening of schools in many states and regions is left to regional administrations, provided that priority is given to the approach of re-opening schools according to the availability of measures (42). This approach has also been adopted in many countries in Europe. German Chancellor Angela Merkel made a statement on August 28<sup>th</sup>, 2020, saying that “Opening schools is not easy. But children should not be the losers of the pandemic, by keeping schools closed.” On August 27<sup>th</sup>, 2020, Scottish Prime Minister Nicolas Sturgeon stated, “We are waiting for our children to school by providing the morale and education conditions in the safest way” (43).

In summary, as a physician, as well as a teacher and educator, it should be emphasized that quality education and quality health are the assurance of the quality of the future generations of the country. It should be said that it is beneficial to continue face-to-face education by maintaining the necessary protective measures. It should be kept in mind that there are never “zero risks”, even with the best preventive measures to protect against COVID-19. There may also be cases at school, but it is necessary to make the scientific evaluation and decision whether this threatens school health (child-teacher school worker and school-related social epidemic) and take the necessary measures before and after. Here, it is important to provide the most appropriate with flexibility according to regional conditions. It should not be forgotten that education gains are the gains of the country, and it is the guarantee of the future.

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