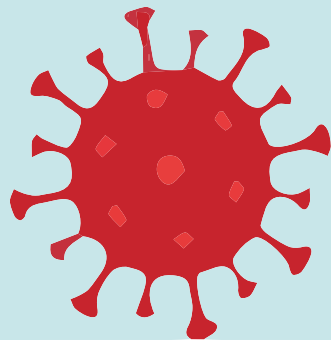


(In)Frequently Asked Questions: COVID-19



Why and How to Protect Children
and Families from COVID-19.

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(In)Frequently Asked Questions: COVID-19

About “Living with COVID”

Are you tired of “living with COVID?” I am.

We’ve been dealing with this virus since early 2020, and it’s not going away anytime soon.

COVID could be over – but it’s not. We could have stopped this long ago—but instead, we pretended it was over, which guaranteed that it would never end. We pretended that vaccines were the magic bullet that would end the pandemic. We pretended we didn’t need to take any precautions and we could go to restaurants, bars, packed concert halls, fly in airplanes packed like sardines, and send kids to crowded, poorly ventilated classrooms.

After all, who wants to wear a face mask, test, isolate when sick, avoid restaurants and bars, homeschool, your kids, get vaccinated at

least once a year, and turn down invitations to parties? It’s a lot easier to just pretend the whole thing is over – until it isn’t.

If the tone of this document sounds angry, it is. I am angry, but not at you. I’m angry at the people who gave you misinformation about SARS-CoV-2, how it spreads, what it does to the body, and how it affects kids and young, previously healthy adults. I am angry that

you’ve been misled. That the tools we need to protect ourselves have been politicized or downplayed. That the sacrifices we all made

during the shutdown phase of COVID were wasted, because we didn’t put in place a few, relatively inexpensive fixes that could have protected us all. That approximately 1,000 Americans will die from COVID this week -- and every one of those deaths could have been prevented.

You probably know me as the mom who always wears a mask. The one who insists on monitoring the air quality with my hand-held CO2 monitor. The one with the grey hair that stands up “like Einstein’s, Mom!” as my daughter tells me.

I wear my mask to protect myself and to protect you—and to remind you that we are still in a pandemic, people are still dying, and tens of thousands of people are still being disabled every single day.

I wear a mask because I want COVID to be over. ***And COVID will never be over until we stop spreading it around.***

Every infection is dangerous. And every infection gives the virus trillions of opportunities to change. Viruses always evolve to transmit better between hosts. They do not necessarily evolve to become less dangerous. Whenever we have enough infections, we get a new variant, one that our immune systems need to figure out again. And the cycle goes on.

“I am angry, but not at you. I’m angry at the people who gave you misinformation about SARS-CoV-2.”

COVID and Misinformation

There's a lot of confusion about what COVID is, if it's still a pandemic, how to prevent it, and how serious it is. That's because the only thing that has spread faster than COVID in the last few years is misinformation. The misinformation problem is so severe that the World Health Organization (WHO) has labeled COVID-associated misinformation an "infodemic."

We've been told we "have immunity" once we've had COVID. We've been told that kids aren't affected by it. We've been told that kids are getting sicker these days because they developed some mysterious, non-scientific made-up thing labeled "immunity debt" when schools were shut down for a few months. We've been told that washing our hands or using hand sanitizer will protect us from COVID. We've been told that getting vaccinated eliminates all risk. We've been told we don't need to wear masks anymore. We've been told we can safely go back out in public 24 hours after a positive COVID test.

Every single one of those things is a lie. An outright, inexcusable lie. And those lies don't even start to address the more ridiculous disinformation that continues to spread, such as the insane ideas that horse dewormer, drinking bleach, or the anti-malarial agent hydroxychloroquine could prevent and treat COVID, or that vaccines will alter your DNA or make you grow a bushy tail.

If you believe any of that, well, I have some land in a tropical region of Siberia that I want to sell you.

Why Should You Believe Me?

Who am I and why should you believe me? How do you know that I'm not a source of misinformation? An overly anxious worrywart? Why should you believe me, instead of articles in the media, that blogger who tells you all vaccines are bad, or a CDC director when she says a mask is the "scarlet letter" of the pandemic?

Here's why: My day job is translating health science into language that everyone can understand. I'm a public health professional, an English professor, and an explanatory health journalist. I work for Health Information Publications, a company that provided content for Yahoo Health and WebMD back in the day when the doctor's office was about the only place you could find health information. I've written four books on health topics ranging from family life to Alzheimer's disease.

I started working in pandemic planning in the early 2000s. So, when the first hints of a global health emergency showed up in December 2019, I reached out to a colleague – the former director of emergency public health response for New Mexico – and we got to work.

In early January 2020, she and I wrote a scathing letter to the then-New Mexico Secretary of Health as she proclaimed that the new virus we'd all been hearing about was little more than a flu. That virus would turn out to be COVID.

In 2025, we're in a very different place with COVID. It has now caused more than 32 million deaths worldwide (including 1.2 million-plus in the U.S.), disabled hundreds of millions of adults and children, and continues to wreak harm. Deaths from acute COVID have fallen dramatically but still occur with mind-boggling frequency – about 1,000 per week in the U.S. alone. Hundreds of thousands of studies about COVID and its impact have been published. We are starting to understand more about the long-term effects of infection. And the picture isn't pretty.

That's why I'm reaching out to brief you on what is known about COVID, its transmission, its impact on the body and mind, and what you can do to protect yourselves and the families you work with. You may be a coach, teacher, a childcare provider, school administrator, camp counselor, or other person who cares deeply about children.

You interact with hundreds of kids and parents every day. You have the power to protect them and stop the spread of this virus.

The Basics

What is COVID?

COVID-19 is the disease caused by a coronavirus called Severe Acute Respiratory Syndrome Coronavirus 2, abbreviated SARS-CoV-2. It's #2 because it follows the SARS-1 outbreak in 2003.

While the name of the disease is Coronavirus Disease 2019, properly abbreviated "COVID-19," most people simply call it "COVID." I'll use that convention here.

What is a Virus?

A virus is a microscopic organism that consists of a strand of genetic material (RNA or DNA) inside a protective shell called a **capsid**, which is made of protein. Some viruses surround themselves with an **envelope** of lipids.

On their own, viruses can't make copies of themselves – they only have the instructions. They reproduce by invading a host's cells and using the host cell's equipment to make more copies of the virus.

Coronaviruses are a subfamily of viruses. SARS-CoV-2, the virus that causes COVID, is one of many members of this family. Only some of them can infect humans. Some coronaviruses can cause severe illness, while others cause mild illness.

Asymptomatic Infections

In about half of all SARS-CoV-2 infections, the person never shows symptoms. These asymptomatic infections occur most frequently in young children.

It might seem to be a good thing not to have the misery of coughing, fever, runny nose and generally feeling horrid, but asymptomatic infections cause a heap of trouble. Here's why:

1. People who are infected but don't feel sick never know that they're infected – and they go about their daily business, spreading COVID without knowing it. They infect others, and the spread of SARS-CoV-2 goes on.
2. An asymptomatic infection means that your immune system is not fighting the virus. Think of it like a burglar in the house that manages to win over the dog with biscuits. The dog never barks, so the homeowner never wakes up and calls the police. Likewise, your immune system isn't marshaling its forces to fight the virus – which allows it to rob you blind. People with asymptomatic infections can still develop long-term problems like diabetes, heart disease, and cognitive impairment.

Repeat after me: There is no herd immunity to COVID. Getting COVID doesn't protect you from getting COVID again.

Is COVID still a Pandemic?

A pandemic is a global outbreak of disease. A pandemic happens when a new (novel) virus spreads quickly between people, globally.

COVID is still spreading in every corner of the world, unpredictably. So, by definition, it is still pandemic. New strains continue to emerge, each with different characteristics.

Even if you've had COVID before or if you are immunized, you can still get sick if you get infected.

How Do We Know that COVID is Still Spreading?

Note: On January 21, 2025, the Trump administration imposed a gag order on all health agencies, including the CDC, prohibiting them from publishing any data or other communications. On February 10, 2025, a federal judge ordered that all CDC data be restored.

The US Centers for Disease Control and Prevention (CDC) continued to publish data on COVID cases, emergency department visits, hospitalizations, and deaths. As of February 10, 2025, they had resumed publishing wastewater data, which I'll explain in a minute.

My optimistic self hopes that the data will stay online, updated, and accessible to us all. These data belong to us, the public. As a public health practitioner, I need these data to analyze what is going on and inform the communities where I work. And you need these data to make decisions about health and about keeping the children and staff at Gym Magic safe.

While these data are useful, they are limited because they are incomplete. Here's a quick rundown of what we can and cannot learn from each of these measures, called indicators in public health lingo.

Even if you've had COVID before or if you are immunized, you can still get sick if you get infected.

COVID-19 Update for the United States

Early Indicators

Test Positivity >

% Test Positivity

3.7%

Week ending March 29, 2025
Previous week 3.6%

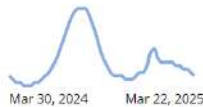


Emergency Department Visits >

% Diagnosed as COVID-19

0.6%

Week ending March 22, 2025
Previous week 0.7%



Severity Indicators

Hospitalizations >

Rate per 100,000 population

2.0

Week ending March 15, 2025
Previous week 2.0

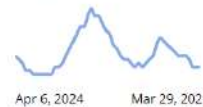


Deaths >

% of All Deaths in U.S. Due to COVID-19

0.8%

Week ending March 29, 2025
Previous week 0.8%



These early indicators represent a portion of national COVID-19 tests and emergency department visits. [Wastewater](#) information also provides early indicators of spread.

Cases

With very little testing, and even fewer cases reported, case counts are severely underestimated. Most people use an at-home test (often incorrectly) and don't report it. Only a few people can afford to get a PCR test from someplace like Walgreen's So we're probably catching about one out of every 50-60 infections in the case numbers.

What's useful? Case counts are somewhat useful, because they show trends. We can ask: Which way is the line heading – up or down? But they certainly don't capture all cases – not by a long shot.

Emergency Department Visits

Emergency department visit data may be slightly more accurate than case counts, but again, there's a lot missing. Not all hospitals are reporting. And no hospitals are testing every patient who shows up at the ED these days. That means a lot of people may show up without “classic” symptoms, never get tested, and not get counted.

What's useful? Data on emergency department visits are useful in tracking new infections that are severe enough that people seek help. Again, because these data are incomplete, it's the trend that counts. It's also an early indicator for health systems and helps them to prepare for an upcoming surge.

Hospitalizations

While hospitalization data is a little better (i.e. how many people are hospitalized because of COVID), only some hospitals and states are reporting. Another problem: hospitalizations are what's called a lagging indicator. Hospitalizations are always behind the spread of the disease. By the time someone is hospitalized with COVID, they've usually been ill (and infectious) for at least a week or two. Then the data are published in a week or two. The result? Information about transmission that is up to a month behind.

What's useful? Again, look for trends (does the line head up or down?). Hospitalizations also tell us about the severity of acute disease caused by current variants.

Deaths

Death numbers are slightly more accurate than other indicators. However, they won't be finalized for several months. The lag time on deaths vs causes, however, is generally about a month. That means this indicator is a look in the rear-view mirror.

What's useful? Data on deaths due to COVID gives us an idea of how severe current variants are and how widely it was spreading – a month beforehand.

Wastewater

The most reliable source of COVID data? Wastewater. COVID (and other bad germs like flu, RSV, and norovirus) show up in sewage water. That's because you pee and poop them out (and so do all those kids you work with every day). Samples are collected and tested in laboratories, and the percentage of viral particles is measured. Researchers then calculate the rate of infection in the population.

The main drawback to wastewater data is that it's most useful in places with large populations. Rural communities that depend on septic systems aren't measurable, and not all towns and cities have the capacity to test wastewater.

What's useful? Wastewater data are the most accurate way to measure how much disease is in a community. In public health lingo, wastewater virus measurement is called a “leading indicator.” This means that wastewater measurements can be used to predict future levels of disease.

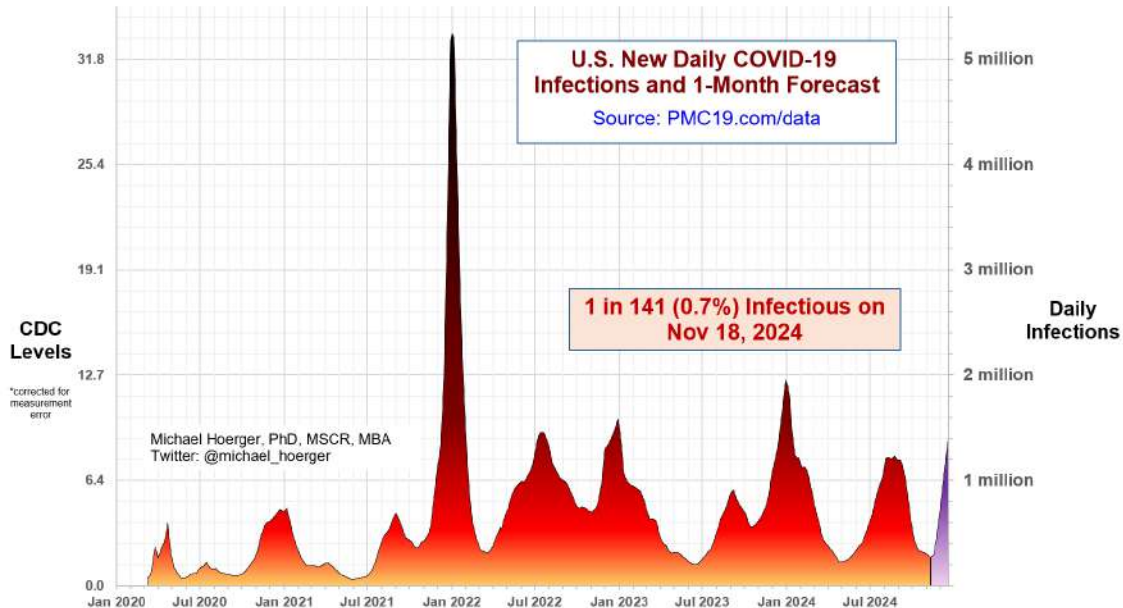
The Pandemic Mitigation Collaborative'

You can find wastewater data at wastewaterscan.org or on the CDC's COVID Data Tracker: <https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance>

However, interpreting raw data can be challenging. That's why I turn to the work of the Pandemic Mitigation Collaborative, a program led by Dr. Mike Hoerger, a researcher at Tulane University. Dr. Hoerger and his team track COVID levels based on wastewater and use the information to model future COVID infections.

Hint: You can download Dr. Hoerger's weekly updates, which include useful and clear interpretation of wastewater data, at <https://pmc19.com/data/>

Here's how Dr. Hoerger's team shows an overview of the data each week:

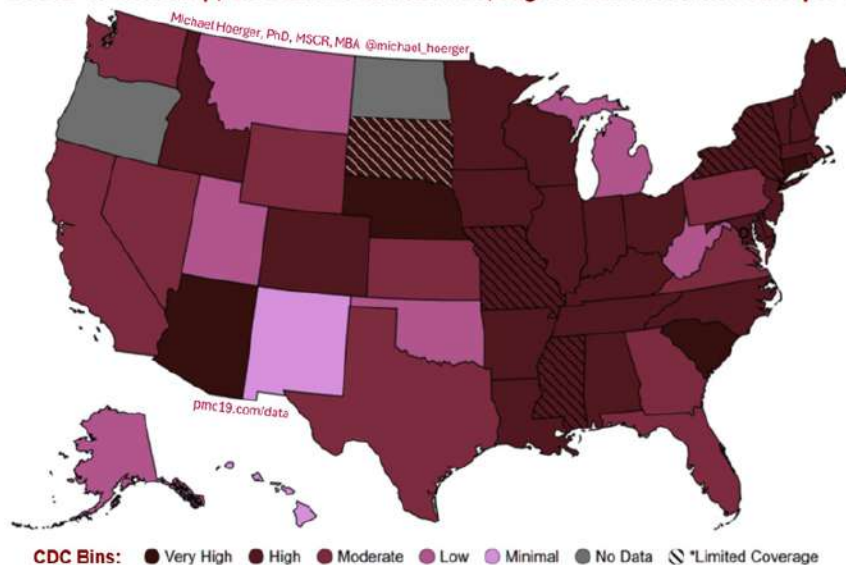


When you look at the graph, you can see that COVID occurs in “waves” that appear closer and closer together, with the peaks representing highest levels of transmission and the troughs the lowest. If you draw a line between the bottom points of each trough, you'll see that the low points are gradually getting higher.

The number of COVID cases has not dropped below 200,000 COVID cases per day in the US since 2020.

Note that these are national data, so they don't show differences by region. Lucky for us, Dr. Hoerger's team continues to access and analyze these data, publishing a “heat map” every week. Here's the map for February 9:

COVID-19 Heat Map, CDC Data & Risk Levels, Higher Transmission in Deeper Red



Note that the heat map uses data collected by state. Most New Mexico data come from Bernalillo and Santa Fe Counties. While Dona Ana County collects some wastewater data from outlying communities, the City of Las Cruces does not. High levels of SARS-CoV-2 in El Paso wastewater are more important to people in Las Cruces than overall state numbers.

Acute vs Chronic COVID

Increasingly, researchers are talking about COVID as a disease that occurs in two phases: acute and chronic.

Acute conditions come and go. The common cold, a broken ankle, and an asthma attack are all examples of acute conditions. They develop suddenly and don't last more than a few days or weeks.

Chronic conditions generally develop over a long time and generally last the rest of a person's life. They can be managed but not cured. Osteoporosis, high blood pressure, and diabetes are examples of chronic conditions.

Some infectious agents such as HIV, Hepatitis B or C, herpes simplex, and certain human papillomaviruses, include both acute and chronic stages. Increasingly, SARS-CoV-2 seems to occur in the same way – causing initial acute illness, then taking up residence in the body. Sometimes the body's immune system can suppress the virus, and it goes dormant. In other cases, the virus continues to do damage.

COVID harms in three major ways:

- 1. During acute infection:** COVID causes immediate damage to the brain, lungs, and the lining of the blood vessels and lymph system, called the endothelium. In some people, especially those who already have heart disease, diabetes, or other problems, the damage can be serious or fatal. As of February 2025, the U.S. was still averaging about 1,000 deaths per week from COVID.
- 2. After acute infection:** Long COVID is thought to occur when the virus remains in the body, actively replicating. The live virus continues to cause damage.
- 3. Secondary problems:** Often, people seem to recover fully from COVID, but develop new conditions such as diabetes, heart disease, stroke, bone and joint problems, and dementia. People with existing health issues often find them worsening quickly. The risk is elevated for at least three years, and probably longer. Kids aren't exempt: A 2021 study found SARS-CoV-2 in the tonsils of children who had recovered from acute COVID; a 2020 study found heart damage in all children who had been infected.

What are the Symptoms of Acute COVID?

Most often, COVID seems like a respiratory illness, often starting with a sore throat, fever, cough, chills, and fatigue. For some people, gastrointestinal distress (vomiting, diarrhea, stomachache) may be the only symptom. Some people lose their sense of taste and smell (or experience changes in taste and smell). And some people get very sick and even die.

Colds, Flu, Allergies, and COVID-19: Comparing Symptoms

COVID is often confused with colds, flu, or allergies. Here's a quick chart to help you tell the difference. And, of course, if you're sick in any way, please test and stay home!

Symptom	Cold	Flu	Airborne Allergy	COVID
Fever	Rare	Usual, high (100-102°F). Sometimes higher, especially in young children. Lasts 3-4 days	Never	Common
Headache	Uncommon	Common	Uncommon	Common
General Aches & Pains	Slight	Usual, often severe	Never	Common
Fatigue, Weakness	Sometimes	Usual, can last up to 3 weeks	Sometimes	Common
Extreme Exhaustion	Never	Usual, at the beginning of the illness	Never	Common
Stuffy, Runny Nose	Common	Sometimes	Common	Common
Sneezing	Usual	Sometimes	Usual	Rarely
Sore Throat	Common	Sometimes	Sometimes	Common
Cough	Common	Common, can become severe	Sometimes	Common, dry cough
Chest discomfort	Mild to moderate	Common	Rare, except for those with allergic asthma	Common; can cause trouble breathing or persistent pain or pressures in the chest that calls for immediate emergency care
Loss of taste or smell	Rarely	Rarely	Rarely	Common

Source: National Institutes of Health (2022). Is it Flu, Allergies, or a Cold?

<https://newsinhealth.nih.gov/2022/01/it-flu-covid-19-allergies-or-cold>

Chronic/Long COVID

Acute COVID may seem like a cold, but there's a whole lot more going on behind the scenes of each infection. Once it makes its way into the body via the nose and brain, SARS-CoV-2 spreads through the entire body – often taking up permanent residence in cells and tissues. The virus causes widespread damage to every organ and tissue, including the brain, heart, lungs, immune system, bones, joints, and more.

COVID can cause damage to the body that might not show up for weeks, months, or even years. You know all those headlines you're seeing about young, healthy people suddenly having a heart attack? Almost all of them are probably due to a previous case of acute COVID. Even mild or asymptomatic infections can cause damage – damage that you cannot feel.

Long COVID occurs when somebody doesn't get better after a SARS-CoV-2 infection. Sometimes, people develop new health problems; at other times, existing health problems get worse. These scenarios are all considered Long COVID.

Long COVID is real, common, and its effects are devastating. Long COVID can be disabling, causing children to drop out of school and adults to leave the workforce.

I can't emphasize this point enough: ***There is no treatment for Long COVID.*** Doctors can often help people to manage symptoms, but they don't know how to treat Long COVID itself.

Diagnosing Long COVID can be challenging, because there is currently no standard test such as a blood draw or scan, and because symptoms vary so widely.

Common symptoms include overwhelming fatigue, anxiety, feeling short of breath, racing heart, "brain fog" (a euphemism for brain damage), heart problems, and problems with bones and joints. Almost all people with Long COVID have damage to the immune system, leaving them more vulnerable to other germs and to immune problems including cancers.

- Nearly one out of four adults in the U.S. have Long COVID.
- About 6 million children in the U.S. are living with Long COVID.
- Each time you are infected with SARS-CoV-2, the risk of Long COVID increases. After one COVID infection, one out of ten people develop Long COVID. Among people who have been infected three times, four out of ten have Long COVID.
- Long COVID is most common in people ages 22-44 years – probably because they are most likely to have been infected several times.
- COVID affects even the healthiest and fittest. For instance, a study of U.S. Marines showed that 1 in 4 Marines still had health problems two years after becoming infected with SARS-CoV-2.

The risk of Long COVID increases with each infection. Unless we stop getting infected, everyone will eventually have Long COVID.

Heart and Blood Vessel Disease

“COVID is going to emerge as the leading risk factor for heart disease.”

--Dr. Harry Spelstra

Hundreds of studies have shown that COVID increases the risk of heart and blood vessel damage.

Even after mild or asymptomatic acute COVID, inflammation can cause plaques to build up in the arteries, increasing the risk of stroke and heart attack (Ge et al, 2025). People (and I note here: children are included in “people”) with Long COVID are at even higher risk for cardiovascular disease, probably because of long-term inflammation.

The risk for heart and blood vessel diseases lasts – and increases – up to 12 months after acute COVID (Dai et al, 2025; Y).

What do I mean by “heart and blood vessel diseases?” Here’s a partial list:

- Cerebrovascular disorders (e.g. stroke)
- Dysrhythmias (irregular heartbeats)
- Inflammatory heart disease (e.g. inflammation of the covering of the heart)
- Ischemic heart disease (weakening of the heart caused by reduced blood flow)
- Heart failure (a weakened heart that doesn’t pump enough blood)
- Thromboembolic disease (when blood clots form in a vein; they can lodge in a blood vessel or the lungs)
- Other cardiac disorders

COVID increases the risk of these conditions for everybody:

- Risk increases no matter your age, race/ethnicity, or gender.
- Risk increases whether you have other cardiovascular risk factors or not, including obesity, high blood pressure, diabetes, chronic kidney disease, or high cholesterol.
- Risk increases if you had cardiovascular disease before exposure to COVID – or if you didn’t.
- Risk increases a lot in both adults and children who were hospitalized with COVID.
- COVID increases the risk of heart and blood vessel disease for everyone who had COVID, both during and long after the acute infection.

Children and teens, like adults, are at increased risk of heart and blood vessel disease after infection. Damage to children’s cardiovascular systems may not be as obvious as in adults – partly because they haven’t had time to eat as many Big Macs, so they start out with healthier hearts and blood vessels.

Here are four studies about COVID, heart disease, and children that should make you sit up and take notice:

- In December 2020, a research team from the Children’s Hospital of Pennsylvania (CHOP), published results from a study of 50 children who had been seen at the hospital for COVID (Diorio et al, 2020). Of those children, 21 had minimal or no symptoms of COVID, 11 had severe COVID, and 18 developed a serious inflammatory condition.

The researchers found elevated levels of a biomarker related to blood vessel damage in almost all children in the study, even in children who had minimal or no symptoms of COVID-19. Most children with SARS-CoV-2 infection also met clinical and diagnostic criteria for a clotting disorder called **thrombotic microangiopathy (TMA)**. TMA is a syndrome that involves clotting in small blood vessels and has been identified as a potential cause for severe manifestations of COVID-19 in adults.

- In 2020, an investigative team led by Alvaro Moreira, MD, MSc, of the University of Texas Health Science Center at San Antonio found damaged hearts in most children who developed multisystem inflammatory syndrome (MIS-C) during or after acute COVID. Some children will need lifelong monitoring and interventions. Most of the 662 children in the study had elevated levels of markers such as troponin, which is used with great accuracy in adults to diagnose heart attacks. The team also identified several case studies in which children developed MIS-C – and heart damage – three or four weeks after asymptomatic infections.
- In 2024, a team of researchers working on the NIH Recover project published a preprint (Zhang et al, 2024) showing that more than two out of 100 children with COVID developed serious cardiac or blood vessel problems within six months to a year after infection. The team followed 1,213,322 young people for at least six months after SARS-CoV-2 infection. The study population included people ages 0 to 21 years who had asymptomatic, mild, moderate, and severe COVID. They found that the risk of cardiovascular events in these children and young adults increased by 60% after COVID.
- In 2025, an Italian research team published results of an examination of children’s hearts after COVID. The researchers used a special scanning technique to examine the heart tissue of children who had COVID but were no longer in the acute phase. They found lasting damage to heart tissue in almost all children.

What keeps me up at night about this one? In most cases, the changes were so small that they couldn’t be detected except with the very sophisticated scanning tools that the researchers used. The children showed no outward signs of heart disease. But the damage in these kids’ hearts and blood vessels is only going to get worse if it’s not recognized and treated. That means COVID is setting our children up for heart disease in their late teens or early adulthood –and we don’t even know it.

We’ve known since 2020 that COVID can cause long-term damage to our children’s hearts and circulatory systems, setting them up for a lifetime of heart disease. We also know that every re-infection damages the heart and blood vessels more.

And we’re still not protecting our kids?

Diabetes

COVID increase the risk of diabetes – a lot. The best summary of the research on COVID and diabetes comes from a team at the National Institutes of Health (NIH) (2024). They reviewed the medical records of more than 60,000 teens who had COVID and compared them to teens who not been infected. They found that each infection increased the risk of developing type-2 diabetes by about 50%. The risk was highest in teens who had been hospitalized for COVID.

Immune System Damage

Among the many problems that SARS-CoV-2 causes, immune system damage is one of the most worrisome – especially for kids. Every infection damages the cells in our immune system that help it to recognize and attack invaders, called **CD8+ T cells**.

Damage to CD8+ T cells leads to problems with immune function. Viruses such as hepatitis C or HIV damage the immune system in a similar way. This dysfunction causes lasting damage and may play a role in long COVID. The now-damaged immune system can't respond robustly to subsequent infections by SARS-CoV-2 variants or other pathogens. Several studies suggest that SARS-CoV-2 infection increases the risk of cancer, as well, possibly by suppressing the immune response.

So... if you're wondering why you and your kids are sick all the time, and why that flu is hitting so hard, and why colds seem to last for three weeks or more, and why you've suddenly developed new allergies... don't blame shutdowns. Blame damage from SARS-CoV-2.

What about "Immunity Debt?"

You may have heard the argument that kids weren't exposed to enough viruses and bacteria during the shutdown phase of COVID, so that's why they're getting sick all the time these days. Somebody somewhere coined the term "Immunity debt" to describe the phenomenon that is... simply not true.

The idea of immunity debt is hogwash!

The argument is based on a deep misunderstanding of how the immune system works. Your immune system is not a muscle that needs to be exercised. Even during the strictest stages of the shutdown, kids were around family members, pets, and the environment, where there are plenty of viruses and bacteria to go around. Their immune systems learned to recognize and respond to pathogens.

Herd Immunity

Early in the COVID pandemic, some groups proposed that young and healthy people all needed to get COVID to build up "herd immunity." Herd immunity occurs when enough people are immune to a disease that the infection can't spread from person to person. This protects people who aren't immunized.

Supposedly, this was then going to protect more vulnerable populations (e.g. old folks like me). That's simply more hogwash! **There is no "herd immunity" from COVID, whether via vaccines or infection.**

Note: Unfortunately, one of the authors of the herd immunity nonsense, Jay Bhattacharya, which was propagated as the "Great Barrington Declaration," was appointed in February 2025 as head of the National Institutes of Health. What could go wrong?

Here's why herd immunity to COVID is not possible: The SARS-CoV-2 virus mutates quickly – so quickly that immune systems and vaccines can't keep up. It's as if one day the intruder is wearing a red hat. If you've been vaccinated or infected recently, your immune system says, "Ha! It's Mr. Red Hat" and marshals the troops to go fight him off. The next time, however, Mr. Red Hat's cousin shows up wearing a blue hat. Your immune system learned how to recognize Mr. Red Hat, but it doesn't recognize that Mr. Blue Hat is his close cousin.

So, when Mr. Blue Hat shows up, your immune system doesn't know what to do. Even worse, it may shrug and give him the keys to the kingdom.

The immune systems says, "Oops!" Eventually, it fights off the worst effects of Mr. Blue Hat. But then a few months later, SARS-CoV-2 shows up again... this time wearing an orange hat. And on and on and on it goes, each time causing more damage to your immune system.

**There is no
"herd immunity"
from COVID,
whether via
vaccines or
infection.**

Brain Damage

The evidence is clear: COVID damages brains. Damaged brains lead to weird behaviors. Weird behaviors, especially in children, may be misdiagnosed as mental health or behavioral problems. These problems have usually been attributed, falsely, to shutting down schools for a few months in 2020/2021. COVID may also be linked to poorer performance on tests and other learning tasks.

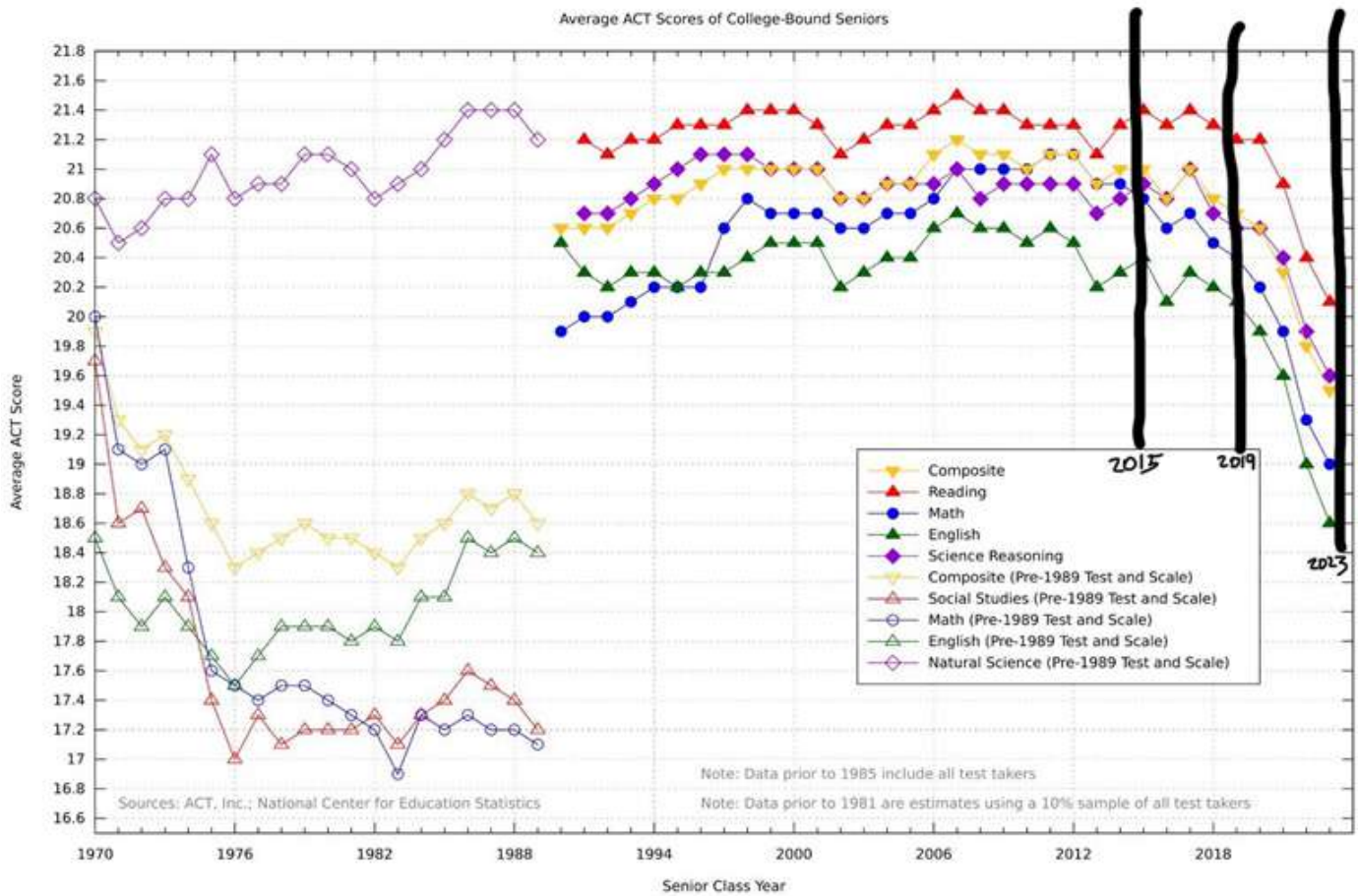
Hundreds of studies have been published showing that SARS-CoV-2 invades and damages brains. Some of the more notable studies include:

- A 2022 study that showed IQ dropped about 3 points after each case of mild COVID and about 9 points for each severe case.
- A 2022 study by a research team from Taiwan showed wide-ranging behavioral problems in kids who had been infected. Researchers compared the mental and behavioral health of 84 children ages 6 to 16 years who had COVID during the previous six months to 84 children who had not been infected. Children who had been infected showed more severe symptoms of inattention, hyperactivity-impulsivity, opposition, a wide range of emotional and behavioral problems, and poor school functions, school attitude, social interaction, school behavioral problems, and interaction problems with their parents (Shang et al, 2022).
- A study published in 2023 by a German research team that found SARS-CoV-2 spike protein builds up and stays in the body for years after infection, especially in the skull-meninges-brain axis. The buildup of the spike protein was linked to inflammation and damage to blood vessels and neurons. mRNA vaccines reduced, but did not eliminate, the amount of spike protein in the brain.
- In 2024, a research team from Weill Cornell University found that SARS-CoV-2 is particularly good at infiltrating some types of neurons in the brain that produce dopamine—a neurotransmitter responsible for feelings of pleasure, motivation, memory, sleep, and movement. The team found that infected cells can lose their ability to grow and divide. The cells also stop producing dopamine and instead send out signals that cause inflammation. A loss of dopamine-producing neurons is associated with Parkinson’s disease—a slowly developing neurodegenerative condition that leads to tremors and, often, dementia.
- In 2024, a research team led by Igor Koralnik, MD, of the Northwestern University Feinberg School of Medicine, found that young and middle-aged adults with long COVID were more likely than older patients to experience neurological problems. Problems included headache, numbness and tingling, smell and taste impairment, blurred vision, depression, anxiety, insomnia, fatigue, and cognitive dysfunction.
- In 2025, researchers from the University of Otago published results of an examination of thinking and reasoning skills, or cognitive performance, in 94 undergraduate students who had previously had COVID. They assessed the students’ cognitive performance in three steps:
 - Step 1: Ask:** 4 out of 10 (40%) students said they experienced “brain fog” after having COVID.
 - Step 2: Test:** Researchers administered a computerized test used to diagnose cognitive impairment. Nearly **4 out of 10 students (37%)** were still having difficulty thinking clearly up to 17 months after having COVID.
 - Step 3 Scan:** A special scanning technique was used to examine the students’ brains. In **37% of the students, blood flow in the prefrontal** cortex was altered. The prefrontal cortex is the part of the brain responsible for decision making, reasoning, personality expression, maintaining social appropriateness, and other complex cognitive behaviors. These young adults’ brains looked like they had aged 20 to 30 years.
- In 2023, a U.K.-based team found that children with previous COVID-19, hospitalized and non-hospitalized, had **more than two times higher odds** of developing both depression and anxiety, compared to those without a previous COVID-19 infection (Mat Hassan 2023).

So, you say. If COVID were damaging kids' brains, wouldn't we see something? Like trouble with school performance or... perhaps, dropping ACT scores?

Figure 1 shows the average ACT scores of college-bound seniors from 1970 to 2023. Do you see anything? I could go on, but I think I've made my point: COVID damages brains.

Figure 1



Reproductive Health

COVID affects reproductive health in both males and females. Although almost all studies of reproductive health and COVID have involved adults, it's reasonable to assume that children and teens are also affected.

Here are some of the things researchers have found about COVID and reproductive health:

Males

- Several studies show that both acute and long COVID affect seminal fluid, sperm count, and other aspects of male fertility (Pourmasumi et al, 2022).
- Some studies have reported that COVID negatively impacts seminal fluid quality (42, 43), leading to low sperm count, poor sperm motility (Gacci, 2021).
- Other researchers demonstrated that semen can shed the virus for up to six weeks after acute COVID (Li et al 2020; Koc et al, 2021).
- What about vaccination, you ask? Several studies have examined the impact of COVID vaccines on fertility and found no association (Pourmasumi et al, 2022).

Females

- SARS-CoV-2 infection can seriously damage women's reproductive health. COVID has been linked to problems with ovaries, including premature menopause, endometriosis, pelvic pain, and menstrual irregularities including excessive bleeding, painful periods, or lack of periods (amenorrhea).
- Women with other symptoms of long COVID seem to be especially vulnerable.
- What about COVID vaccines and women's fertility? Study after study has shown no effect on fertility. Women may experience a heavier period for a couple of cycles after vaccination, which is a normal reaction to any stressor – and vaccines create good stress by giving the immune system a training session.

Special Populations

**“We need to be very firm with our messaging.
There’s no such thing as a mild SARS-CoV-2 infection.
There’s no such thing as a SARS-CoV-2 infection that
does not have prolonged consequences.”**

-Dr. David Putrino

You’ve probably heard about COVID being extremely risky for people who are older, immunocompromised, or have other health problems such as high blood pressure, diabetes, asthma, or overweight/obesity. True, some people are more vulnerable to severe disease, long-term problems, and death.

What is not true is the myth that COVID only affects some populations. When we say, “Oh, it only affects _____ [fill in the blank: “old people,” “people with heart disease” “kids with diabetes” etc. etc.].

More importantly, we can’t act like only some people are affected. When we don’t build protective environments, we exclude people from participating in life.

The conditions that increase the risk of poor outcomes from COVID affect about 67% of the U.S. population – including a lot of kids and parents and grandparents who are part of the Gym Magic community.

The attitude that “only some people are at risk” is morally and ethically wrong. Doesn’t a kid with diabetes deserve to be able to fully participate in school, gym, and all other aspects of life?

It also smacks of eugenics. Early in the COVID pandemic, I was talking with a friend about musician John Prine, who died of COVID.

My friend’s response? “Oh, he was old and had cancer anyway.”

I was shocked – and saddened. Nobody deserves to die a COVID death. And to write off someone’s death because he was already fragile and ill, well... that’s just not in my moral universe.

And now I’m going to say the quiet part out loud: There is no such thing as a COVID infection that doesn’t have long-lasting consequences. We might not see those consequences for years – or we might see them immediately. But they are there, real, and are already affecting us as a global population.

In the rest of this section, I’m going to talk about the impact of COVID on three specific populations that frequent Gym Magic: kids, athletes, and pregnant women. I do realize that these populations often overlap.

Kids and COVID

By now, most kids have had COVID, at least once or twice – and they seem fine, right?

On the surface, yes. Kids seem to fare better with acute COVID. Most of the time, they get mildly sick with cold or flu-like symptoms and appear to recover. Kids are also more likely to experience asymptomatic infections.

However, kids are more vulnerable than it appears. SARS-CoV-2 does long-term damage to our children's bodies and minds, even when we don't recognize it. Children's developing skeletal, neurological, cardiovascular, respiratory, gastrointestinal, endocrine, and immunological systems can all be disrupted. No one knows how kids are going to fare in 5, 10, or 15 years.

Here are some key facts about kids and COVID:

- CDC data show:
 - COVID is still the third leading cause of death in children in the United States
 - Children younger than 3 years die from COVID at a rate similar to people 85 years and older.
- A research team led by Yong-Bo Zheng of Peking University published results of a systematic review of prevalence and risk factors for Long COVID in children and adolescents (2025). After reviewing 40 studies, they calculated that nearly one quarter (24%) of children and teens who survived COVID experienced multisystem Long COVID.
- Findings from a study of nearly 1000 teenagers who caught Covid in 2020 showed that one out of three developed Long Covid symptoms. Two years later, in 2022, nearly a third of those with Long Covid were still sick (Gross et al, 2024).
- A recent study (Buonsenso et al, 2025) shows that the “shutdowns caused all the problems in kids” theory is absolute malarkey. Researchers found that children with long COVID had distinctive proteins in their blood. These findings could be used to diagnose Long COVID in children.

COVID can cause so many problems that it's hard to tease out what problems are caused by COVID and which conditions that would have arisen anyway. Any SARS-CoV-2 infection can both cause new problems and worsen existing problems.

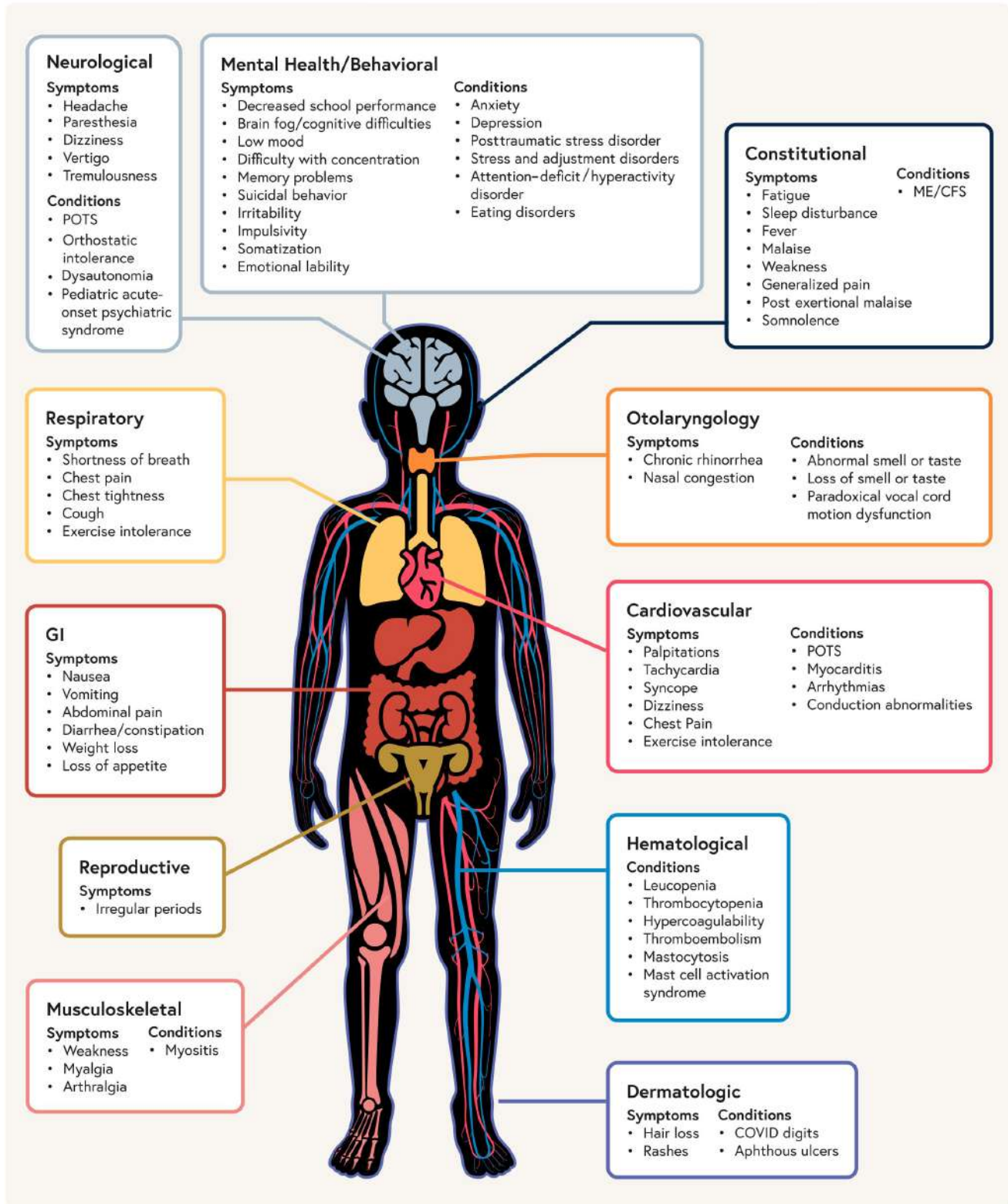
COVID can damage hearts, lungs, bones, skeletal muscle, blood vessels, the digestive tract, kidneys, skin, and more. Figure 2 shows post-acute COVID conditions commonly seen in children.

In addition, talented, smart, athletic kids (especially those with ADHD) may be at higher risk of Long COVID, according to results from a metanalysis (a “study of studies”) of Long COVID and kids.

This research team analyzed studies involving thousands of kids who had previously had COVID. They found that healthy, active, high IQ kids were at the highest risk of developing Long COVID after an acute infection.

Figure 2

Potential COVID Complications in Children



Source: 'Postacute Sequelae of SARS-CoV-2 in Children' by Rao *et al* (7 Feb. 2024 © American Academy of Pediatrics)

COVID in Athletes

I hope that the years at Gym Magic are just the start of a long and healthy life for my daughter – a life that includes any sport that she wants to do. That after “graduating” from gymnastics, she’ll be able to dance, run, swim, walk, hike, bicycle, or engage in any sport she chooses.

Each time she is infected with COVID, it becomes less likely that she will be able to make those choices.

COVID damages hearts and brains and has ended many athletes’ dreams and careers. Athletes with long COVID often experience symptoms such as fatigue, difficulty breathing, irregular heartbeat, and exercise intolerance (Ribeiro et al, 2024).

Athletes rely on strong hearts to pump the blood and oxygen they need to every cell in their body to perform. COVID attacks hearts, even in young, healthy athletes.

Inflammation of the heart muscle – a condition called **myocarditis** – is 15 times more common after acute COVID than in general. Symptoms of myocarditis include chest pain or tightness, shortness of breath, palpitations (sensation of irregular heartbeat), decreased exercise tolerance, and swelling in the extremities.

Severe myocarditis can cause sudden cardiac arrest and has been linked with 10%-20% of all sudden deaths in young athletes. COVID-19 myocarditis has been linked to several sudden cardiac deaths in patients who only had mild viral infection symptoms.

Returning to sport too quickly after acute COVID can delay healing and lead to long COVID – or sudden death from cardiac complications.

The American Medical Society for Sports Medicine and the American College of Cardiology recommend that anyone diagnosed with COVID should be asymptomatic for at least 10 days before considering returning to exercise.

Athletes who want to return to strenuous or vigorous exercise should see their primary care provider for cardiac screening before participating. The screening may include:

- Review of symptoms
- Physical examination
- EKG
- Blood tests for damage of heart muscle cells
- Echocardiogram or ultrasound of the heart

If the tests show any abnormalities, the Society recommends a consultation with a cardiologist and cardiac magnetic resonance imaging. If there are no signs of myocarditis, experts recommend a gradual increase in exercise intensity over at least one week, monitoring for symptoms such as chest tightness, exercise intolerance or shortness of breath. If any of these symptoms occur, the athlete should stop the exercise immediately and contact their primary care provider for further evaluation.

A study published in February 2025 (Diebold et al) suggests that even the most fit athletes suffer long-term effects from COVID. Researchers collected information from 65 athletes at the German Olympic training center. All had mild cases of acute COVID during 2020-2021. About half of the athletes had contracted COVID during training or competitions, with no difference between those engaged in contact versus no-contact sports. This type of transmission is expected with an airborne virus.

In addition, the athletes experienced lasting effects from their infections. At 16 weeks after infection, the majority (64%) of athletes said that they still were not performing at their best nor training as hard and frequently as usual. This was mostly due to fatigue, shortness of breath during exercise, and joint and muscle pain.

COVID and Pregnancy

Gym Magic serves many growing families, which means pregnant women are often part of the mix in the lobby, swimming pool, or other activities. It's very, very important that these families are protected. This is a red alert population when it comes to COVID!

COVID is bad news for both mom and baby.

Mom

Pregnant women are at much higher risk of death and complications from COVID infections. They are more likely to be hospitalized with COVID, require mechanical breathing assistance, and to die. Here are a few studies that demonstrate how incredibly dangerous COVID is for pregnant women:

- Data from the US CDC on maternal mortality show that in 2021, infection was the most frequent underlying cause of death (48.8%). COVID accounted for 40.5% of all pregnancy-related death.
- A Canadian study published in 2022 (McClymont et al, 2022) showed that getting COVID-19 when pregnant increases risks of hospitalization, premature birth, ICU admissions. According to study lead Dr. Deborah Money, "It basically bumps pregnant women into a much older risk category, and mostly pregnant women look pretty darn healthy so we don't necessarily associate that with risk for complications."
- A Scottish study published in 2022 (Stock et al, 2022) showed that women who gave birth within 28 days of a positive COVID test died at a significantly higher rate than their healthy counterparts.
- Women who get COVID during pregnancy are more likely to develop Long COVID.

Baby

COVID infection during pregnancy has been associated with birth defects, stillbirths, neurodevelopmental disorders, and many other problems. Here are a few studies that show some of the problems that can arise when pregnant people are infected.

Premature birth:

- Having COVID late in pregnancy may increase the risk of premature birth seven-fold. A team led by Tal Patalon at Maccabi Healthcare Services in Tel Aviv, Israel, and her colleagues tracked the birth outcomes of 2753 women who had a positive COVID test at any stage of their pregnancy. They compared birth outcomes with the same number of pregnant women who didn't get infected during pregnancy.

Researchers didn't find an increase in premature births in women who had COVID during the first six months – about 27 weeks – of pregnancy. But women who were infected in the last three months – week 28 onwards – were more than twice as likely to have a premature birth than those who didn't test positive. Women who had COVID after week 34 were seven times more likely to give birth prematurely, regardless of the severity of the infection.

The researchers didn't track the women's covid-19 vaccination status.

- Lung problems.
 - A UCLA-led research team (Man et al, 2024) found that infants born full-term to mothers who were infected with COVID-19 during pregnancy had three times the risk of having respiratory distress compared with unexposed infants, even though they themselves were not infected with the virus. Infants with respiratory distress were hospitalized for an average of 24 days. The risk was significantly lower when the mothers infected during pregnancy were previously vaccinated.
- Damage to the placenta and poor pregnancy outcomes. Many studies have shown that COVID can damage the placenta – the temporary organ that forms in the womb during pregnancy to provide oxygen and nutrients to the developing fetus. Here are a few:
 - A research team led by Dr. Bharti Joshi (2022) of the Department of Obstetrics and Gynecology, PGIMER, India, found extensive damage to placentae in 50% of women who contracted COVID during pregnancy. Pregnant women with COVID and damage to the placenta were more likely to have poor pregnancy outcomes, most frequently stillbirth.
 - A study published in the American Journal of Obstetrics & Gynecology suggests that a COVID infection decreases the placenta's immune response to fend off future infections, potentially affecting fetal development.
 - A research team from South Africa examined changes in morphology and physiology of the fetus and placenta. Their findings, published in 2023 in the journal Placenta (Heeralall, 2023), show COVID can harm blood vessels in the placenta. Damaged blood vessels can't transport oxygen effectively from mom to fetus and can negatively impact fetal development.
- Neurodevelopmental problems. Multiple studies have associated COVID infection during pregnancy with higher risk of developmental delays, mental health issues, and other neurological problems:
 - Findings from a study led by Karin Nielsen of UCLA's Mattel Children's Hospital show that more than one out of 10 (11.6%) toddlers born to mothers with lab-confirmed SARS-CoV-2 infection during pregnancy showed cognitive, motor or language problems indicative of neurodevelopmental delays. That's about 10 times the rate in mothers who didn't have COVID during pregnancy (two of 128, or 1.6%).
 - In 2022, Edlow and colleagues reported that infants born to mothers who tested positive for COVID during pregnancy were more than twice as likely to have developmental delays as their peers. The most common developmental delays seen in babies to mothers who tested positive for COVID during pregnancy were motor, language, and speech disorders.
 - In 2024, an international research team led by Dr. Viviana Farjado-Martinez reported that children exposed to COVID during pregnancy have a tenfold higher frequency of developmental disorders compared to controls. They suggest that all children born to mothers who contract COVID during pregnancy should be offered neurodevelopmental follow-up.
- Birth defects. COVID during pregnancy is strongly associated with birth defects. For example:
 - A research team from China (Ren et al, 2024) found that the risk of congenital heart defects increased by 16% when women were infected by COVID during pregnancy.
 - In a study of the pregnancy outcomes of Iranian women (Heidarzadeh et al, 2022), researchers found a dramatic increase in infants born with central nervous system and genitourinary disorders.

COVID Vaccines During Pregnancy

Vaccination could help reduce the risk for pregnant women and their fetuses, especially of severe disease. But disinformation about vaccine safety has led pregnant women to refuse vaccines. Only 10% percent are up to date on COVID vaccinations.

Yet study after study shows that vaccination during pregnancy is safe and dramatically reduces the risk of poor outcomes for both mom and baby (Raffetti et al, 2024). Infants born to vaccinated mothers gain antibodies against SARS-CoV-2, which helps to protect them for their first six months. Infants can be vaccinated themselves at six months.

COVID in Childcare and School Settings

People who work with children and teens are on the front line of stopping the pandemic – and helping our kids to have a future.

About 70% of SARS-CoV-2 transmission has been attributed to schools and childcare centers. Kids get infected at school or during childcare, then bring it home to their families, spread it to their teachers and other caregivers, and generally act as effective viral vectors.

Many vulnerable family members have died after children contracted COVID in schools and childcare centers. At least 300,000 children in the United States have lost at least one primary caregiver to COVID. Many have been orphaned. Add to that the distress of knowing you're the one who brought it home. Knowing that you brought home the disease that killed Grandma is a lifelong mental health battle.



People who work with children and teens are on the front line of stopping the pandemic – and helping our kids to have a future.

What You Can Do

COVID is messing up our kids – and us. It doesn't have to!

Infecting children again and again with a virus that does this much damage does not bode well for them – or for our future as a human race. That's why it's critical that we learn how to prevent COVID infections.

As an early-childhood educator and coach, you can make a big difference if you understand how COVID spreads, what vaccines can and cannot do, what layers of protection to use, and some basics about risk management. Here are eight things you can do to become part of the solution:

1. Learn How COVID Spreads
2. Clean the Air with W.A.T.C.H.
3. Wear a High-Quality Mask
4. Test, Test, and Test Again
5. Keep Vaccines Up to Date
6. Stay Home if Sick
7. Take Time to Recover
8. Recognize signs of Long COVID

1: Learn How COVID Spreads

You know all that handwashing, sanitizing, and wiping down surfaces you've been doing to prevent COVID? It's probably helped you avoid a few tummy bugs, maybe some flu, and a couple of other germs, but hasn't done a darn thing to protect you or anyone else from COVID.

What? Yep. Handwashing, wiping down surfaces, all that sanitizing, does nothing to stop COVID.

Zero. Zip. Nada.

COVID is airborne (Tang et al, 2021). One infected person can transmit COVID to others within minutes at normal indoor conditions (Alsved et al, 2023). SARS-CoV-2 particles are so tiny that they float in the air for hours. Anyone who breathes in even a tiny amount of virus can be infected. Researchers have documented COVID transmission in a room four hours after an infected person was in the room.

SARS-CoV-2 spreads like cigarette smoke. The closer you are to the infected person, the higher the dose of virus that you inhale – and the sicker you are likely to get. Most often, SARS-CoV-2 spreads in poorly ventilated indoor spaces.

Outdoors is much safer, but you can still breathe in enough virus to get sick. Think about it this way: Can you still smell cigarette smoke outdoors?

Here are a couple of short videos showing airborne transmission of SARS-CoV-2:

<https://youtu.be/y7fNaVzOh20?si=fW-YFQxvW49WQMN->

https://youtu.be/UbQ9Kl9CqUU?si=afxCc_o1VfGvEnUS

2: Clean the Air with W.A.T.C.H.

Management is responsible for installing ventilation and filtration systems, developing policies, and providing employee training to ensure that the air inside buildings is safe.

Employees also play an important role in creating safer indoor environments. You are there, on the ground, and you make decisions about opening windows and doors, turning on air filters, and more.

The “W.A.T.C.H.” method, a checklist developed by air quality engineer Joey Fox, offers a framework for employees to improve indoor air quality and reduce risk to building occupants. W.A.T.C.H. stands for Windows, Air Movement, Thermostat, Carbon Dioxide, HEPA Filter. It can be applied to almost any building.

All workers who share a space (including a vehicle) should learn how to use W.A.T.C.H.

You can download a PDF of the W.A.T.C.H. graphic here: <https://www.dropbox.com/s/qya7t762s5arxws/Clean%20air%20at%20work.pdf?dl=0>

Here’s a summary:

Windows

- Open windows - even cracking windows slightly can help
- Keep doors open – it helps air to circulate even more
- During warm weather, open two windows and use a fan to blow air out of one of the windows.

By opening windows and doors, you can achieve as much as 6.6 air changes per hour (ACH). That’s moving a lot of air!

Air Movement

- Check to see if you feel air coming from diffusers or air vents
- Attach a ribbon to the vent for an easy visual cue that it’s working

While the impact of air movement depends on many factors, you’ll add at least 2-3 ACH by making sure the air is moving.

Thermostat

- Make sure the FAN setting is ON when the room is occupied (It’s okay to use AUTO when the room will not be occupied)

You can gain at least 2-3 ACH by assuring the fan is on.

Carbon Dioxide (CO₂)

- Use a CO₂ monitor with a nondispersive infrared (NDIR) sensor
- If CO₂ levels are higher than 800 ppm (parts per million) and continue to go up, increase ventilation and/or reduce the number of people in the room until CO₂ falls to safe levels again.

Measuring CO2 doesn't change ventilation, but it helps you to know whether ventilation is adequate.

HEPA Filter or Corsi-Rosenthal Box

Purchase a commercial HEPA filter or build a Corsi-Rosenthal box.

- Set the filter on the highest setting (noise permitting)
- Disable features like:
 - Ionization
 - Plasma
 - UV with Catalyst
 - Auto
- Place the filter correctly!
 - Move away from walls & corners (about 2 feet)
 - Place as close to the center of the room as possible
 - Avoid blowing air directly at anyone
 - Face away from walls and obstructions
 - Raised is better than on the floor
 - Keep away from clean air sources such as open windows, air vents, and other HEPA filters
- If you have several HEPA filters, space them out evenly

The impact on ACH varies for commercial HEPA filters. Each properly used Corsi-Rosenthal box adds an additional 3 ACH when the fan is turned on low.

Note: Filtering the air will not change CO2 levels.

3: Wear a High-Quality Mask

What about masks? High-quality masks provide an important layer of protection against SARS-CoV-2. They are especially important when people are close together (less than 6 feet apart). You should always wear a high-quality mask when indoors or outdoors when there are a lot of people.

What do I mean by a “high-quality” mask? A mask that is technically called a respirator, such as an N-95 or FFP 100. These masks fit your face tightly, so no air can come in or out of the sides of the mask. Properly fitted, an N95 can filter out... you guessed it.. 95% of particles above 3 microns in diameter. KF94 or KN95 respirators also provide extremely good filtration, but these earloop models are more difficult to fit with no gaps.

4: Test, Test, and Test Again

Testing is an essential protective layer for COVID – not only for you, but for those around you. There may not be a lot of emphasis on testing anymore, but it's still a critically important tool.

There are two types of tests that are used to diagnose COVID: molecular tests and antigen tests.

- Molecular tests, which you may have heard of as “PCR” tests (PCR stands for polymerase chain reaction) or “NAATs” (nucleic acid amplification tests), detect genetic material called RNA from the virus. You'll have to go to a testing site (e.g. a pharmacy or health-care provider) to get a molecular test.
- Antigen tests, often called “rapid tests” or “home tests” detect easy-to-find proteins on the surface of the virus. You can buy a rapid antigen test at almost any pharmacy, grocery store, or “big box” store.

How rapid antigen tests work

An antigen is any foreign substance that your body sees as an invader. These proteins are called antigens. As the virus replicates and builds up in your system the level of antigens increases. Once enough antigens are present, the test will turn positive. On the other hand, you could be infected but there might not be enough antigens in your nasal mucus for the test to be positive.

Every test differs slightly, so I won't go through the step-by-step of using a particular test.

Most tests available in the U.S. include a nasal swab that you use to collect a sample from your nose. You then swirl the swab around in a solution for a few seconds, put a few drops of solution in the test cartridge, and wait about 15 minutes for a red or pink line to show up. You've probably done this many times over the last few years, so I won't belabor the point. Just be sure to carefully follow the manufacturer's instructions to avoid a false-negative reading.

When to Test

You should test if:

- You have COVID symptoms (sore throat, cough, fatigue, brain fog, fever, etc.)
- You've been around someone who has COVID
- You've been indoors in a crowded place (Taylor Swift concert, wedding, funeral, etc.)
- You've been traveling, especially on an airplane

Symptomatic (i.e. you feel sick!)

Test on the first day you are sick. If the result is negative, repeat the test every 48 hours (i.e. every other day) for 10 days. Take precautions (isolate and mask). Even if it's not COVID, you don't want to spread it around!

Asymptomatic (i.e. you don't feel sick)

About half of all SARS-CoV-2 infections are asymptomatic – so being sick is not a good gauge of whether you are infected. If it's likely that you've been exposed, test starting five days after your last exposure. If the test is negative, repeat again on day 7 and day 9 (i.e. every 48 hours) if you don't develop symptoms. Mask in public for 10 days.

Above all, use common sense! If it looks like COVID, feels like COVID, and smells like COVID, it's probably.... COVID!

5: Keep Vaccines Up to Date

You're vaccinated? That's great! Everybody should stay up to date with their COVID vaccines. Up to date means at least once per year, according to the CDC. However, data show that protection may not last that long. Most research indicates that vaccination every 6 months is right.

Vaccination is an important layer of protection from COVID. Vaccination reduces transmission (but does not stop it). It also reduces the severity of illness and likelihood of death. It decreases the risk of Long COVID by about 40%.

COVID vaccines are safe for children 6 months and older, pregnant women, and adults of all ages. Hundreds of millions of COVID vaccines have been given, with very, very few adverse effects. The risk of a bad reaction to a COVID vaccine is less than one in a million – and most reactions are the result of allergies to some of the ingredients in the vaccines.

As helpful as they are, however, COVID vaccines do not stop infection. Nor do vaccines seem to affect

What does a 40% reduction in risk mean?

Assuming that 10 percent of COVID cases lead to Long COVID, a 40% reduction in risk means that if 100 unvaccinated people get COVID, 10 will develop Long COVID, while if 100 vaccinated people get COVID, 6 will develop Long COVID.

In other words, vaccines help, but they are not foolproof.

the virus' ability to cause damage to nerves and the brain.

Currently, there are three vaccines available in the U.S., made by three manufacturers: Pfizer, Moderna, and Novavax. All three vaccines teach your body to make a harmless version of part of the SARS-CoV-2 spike protein. This trains your immune system to recognize and fight off SARS-CoV-2 if it shows up.

- Both Pfizer and Moderna use a new technology that starts one step back from traditional vaccines, called mRNA. Instead of introducing a deactivated piece of virus or viral protein, mRNA vaccines provide a “recipe” for your body to make a certain part of the spike protein.
- Novavax is a traditional vaccine that uses a method called “protein subunit.” It includes part of the virus' genetic code (instead of a recipe for that code).

6: Stay Home if Sick

If you are sick, please stay home. Encourage parents to keep their children home when they are sick. Please don't require a doctor's excuse. Parents and kids know if they are sick.

The “stay home if sick” rule applies whether you're sick with COVID or something else. Many infectious diseases are circulating right now, including RSV, norovirus, and flu. H5N1, (“bird flu”) is rapidly spreading among animals and doing its darndest to make the leap to human-to-human transmission. Measles, once eliminated in the United States, is making a comeback. Tuberculosis outbreaks are

How long are you contagious with COVID?

Unfortunately, the old guideline of “24 hours after the last nonmedicated fever” doesn't apply when it comes to COVID. Researchers know that you are contagious a few days before you start feeling poorly and for several days after you start feeling better. That's true for children, too.

As a rule of thumb, if you have COVID, expect to be contagious for about one to two days before symptoms appear, and for up to eight to 10 days after symptoms start (Johns Hopkins). You might not be contagious quite as long if you are asymptomatic or vaccinated. You're likely to be more contagious for a longer time if you have severe symptoms, a weakened immune system, or you're not vaccinated. For how long should I isolate?

If you test positive for COVID-19, isolate (stay away from others) until you've been fever-free for 24 hours without medication, as per CDC guidelines. You should also take extra precautions, including masking, physical distancing, and working from home, for five to seven days afterward to avoid spreading the virus.

Children can be contagious for a week or more after their symptoms resolve (Science et al, 2024). These results were published in *Clinical Infectious Diseases* in 2023 by an investigative team based in Toronto, Ontario. The team probed viral shedding dynamics in 101 children who had COVID from February 1 to March 14, 2022. Researchers conducted daily SARS-CoV-2 testing based on saliva samples for 10 days, and 50 of the participants also completed daily RATs. All testing began within 72 hours of symptoms.

The researchers then compared how long children were symptomatic with how long they were infectious. Four out of ten (40%) of the children were still infectious the day after their symptoms had fully resolved. Seven days after

7: Take Time to Recover

Athletes who have had COVID should rest for 14 days before returning to athletic activity, according to guidelines from Providence Sports Medicine. While they can resume their usual daily activities, they should rest as much as they need.

Emerging evidence suggests that it is risky to return to exercise too soon after contracting COVID, particularly in those that experience symptoms associated with the virus. Doctors recommend following a gradual process to return to activity after testing positive for COVID, whether or not the athlete has experienced symptoms. Much like the process of returning to activity after a concussion, the process should be tailored to the individual athlete's response. The athlete should also get clearance from a medical provider that may include testing of the heart and lungs prior to starting a return to activity progression.

Providence offers the following recommendations for return to activity:

COVID Positive Test, No Symptoms:

1. Rest/no exercise for 14 days from positive test
2. Receive clearance from medical provider to start return to activity stages
3. Complete gradual return to activity program*

COVID Positive Test with Symptoms:

While experiencing symptoms:

1. Rest/recovery with no exercise
2. Talk to your doctor about further cardiac testing

After symptoms have resolved:

- 14 days of rest without exercise
- Receive clearance from medical provider to start return to activity stages. Cardiac screening is strongly recommended before clearance
- Follow medical provider recommendations for return to activity, including a gradual return to activity program*

*See page 2 of the Providence Return to Activity Guidelines.

Alert: Athletes need to monitor fatigue levels and listen to their bodies when resuming activity. They may need time to get back to their prior level of performance. Coaches and educators should monitor children's fatigue levels and look for signs of exertional fatigue.

8: Recognize Signs of Long COVID

If a child in your class suddenly develops new or suddenly worsening behavioral issues, shortness of breath, racing heart, fatigue, decreased performance, muscle and bone pain, or other unusual symptoms, suspect Long COVID.

If you suspect Long COVID:

- Talk with the child's parents and explain your concerns. Suggest that the child get a cardiac workup and other screenings
- Adjust time and demands in gym. Allow the child to rest as needed, providing a dark, quiet space if necessary
- Work to build trust. Use active listening and communicate clearly
- Remember that the child's needs and abilities may vary from day to day or week to week
- Recognize that Long COVID is real

Final Thoughts

The COVID pandemic is but one of the many challenges we face in today's tumultuous world, but it is something that we can do something to stop. As we protect our children – and ourselves – we affirm our care and love for them.

I know that the media, politicians, and even doctors have downplayed the seriousness of COVID. I know that it's been hard to wade through mountains of information and misinformation about this virus and its effects.

I wish I could write truthfully that COVID is nothing to worry about, just a cold. That kids aren't affected. That young adults will recover quickly. That vaccines prevent all infections. That it's over.

But I can't. More than 400,000 papers have been published about COVID, making it the most studied virus ever. And those papers add up to the picture that I've presented here, which is worrisome, to say the least. Fortunately, those papers include the key strategies we can use to stop this virus.

Thank you for all you do to bring the magic of education, gymnastics, Ninja, swimming, arts, crafts, movement, and more to our children. Let's do it safely, protecting ourselves and the children we love. The tools are in your hands.

Resources

COVID Safety for Schools

<https://www.covidsafetyforschools.org/>

A comprehensive website on creating safe environments in schools. Includes online courses, live training, and more.

Clean Air Crew

<https://cleanaircrew.org/>

A compilation of resources on improving indoor air quality. Cleaning indoor air is the most effective way to reduce transmission of COVID, RSV, measles, flu, and other airborne viruses.

Long COVID

<https://x.com/vipintukur/status/1894776432896979075>

<https://www.theguardian.com/society/2025/mar/02/were-losing-decades-of-our-life-to-this-illness-long-covid-patients-on-the-fear-of-being-forgotten>

COVID in Children

<https://youtu.be/hw0WNRjJl7A?si=IniftytFTqtK9tiz>

Long COVID Kids

<https://longcovidkids.org>

Mental Health

COVID for therapists: <https://x.com/HolleyM20/status/1898751373727961342>

A respirator or this? <https://x.com/AnciraBecky/status/1899288382431187049>

People to follow on social media:

Dr. Sean Mullen

JP Weiland

T Ryan Gregory

References

- Ahmed, M., Advani, S., Moreira, A., Zoretic, S., Martinez, J., Chorath, K., Acosta, S., Naqvi, R., Burmeister-Morton, F., Burmeister, F., Tarriela, A., Petershack, M., Evans, M., Hoang, A., Rajasekaran, K., Ahuja, S., & Moreira, A.. (2020). Multisystem inflammatory syndrome in children: A systematic review. *Eclinicalmedicine*, 26, 100527. <https://doi.org/10.1016/j.eclinm.2020.100527>
- Alsved, M., Nyström, K., Thuresson, S. et al. Infectivity of exhaled SARS-CoV-2 aerosols is sufficient to transmit covid-19 within minutes. (2023). *Sci Rep* 13, 21245. <https://doi.org/10.1038/s41598-023-47829-8>
- Buonsenso, D., Cotugno, N., Amodio, D., Pascucci, G. R., Di Sante, G., Pigghi, C., Morrocchi, E., Pucci, A., Olivieri, G., Colantoni, N., Romani, L., Rotili, A., Neri, A., Morello, R., Sali, M., Tremoulet, A., Raffaelli, F., Zampino, G., Rossi, P., . . . Palma, P. (2025). Distinct pro-inflammatory/pro-angiogenic signatures distinguish children with Long COVID from controls. *Pediatric Research*. <https://doi.org/10.1038/s41390-025-03837-0>
- Dai N, Tang X, Hu Y, Lu H, Chen Z, Duan S, Guo W, Prakash Edavi P, You Y, Huang D, Quian J, & Ge J. (2025). SARS-CoV-2 Infection Association with Atherosclerotic Plaque Progression at Coronary CT Angiography and Adverse Cardiovascular Events *Radiology* 314:2
- Diebold, K., Zacher, J., Baum, K., Reuter, H., Schneeweis, C., Schramm, T., Schifferdecker, I., Vassiliadis, A., & Predel, H.-G.. (2025). Long-term clinical outcome and exercise capacity in SARS-CoV-2-positive elite athletes. *German Journal of Exercise and Sport Research*. <https://doi.org/10.1007/s12662-025-01024-1>
- Diorio C, et al. (2020). “Evidence of Thrombotic Microangiopathy in Children with SARS-CoV-2 across the Spectrum of Clinical Presentations,” *Blood Advances*, DOI: 10.1182/bloodadvances.2020003471
- Edlow AG, Castro VM, Shook LL, Kaimal AJ, Perlis RH. (2022). Neurodevelopmental Outcomes at 1 Year in Infants of Mothers Who Tested Positive for SARS-CoV-2 During Pregnancy. (2022). *JAMA Netw Open*. 5(6):e2215787. doi:10.1001/jamanetworkopen.2022.15787
- Fajardo-Martinez, V., Ferreira, F., Fuller, T. et al. (2024). Neurodevelopmental delay in children exposed to maternal SARS-CoV-2 in-utero. *Sci Rep* 14, 11851. <https://doi.org/10.1038/s41598-024-61918-2>
- Farias Arcos Júnior, G., Pulcineli Vieira Francisco, R., Kill, B., Verzinhasse Peres, S., B C Gibelli, M. A., Ibidi, S. M., Brunow de Carvalho, W., Braz Simões, A., Brizot, M. L., Schultz, R., Azevedo Carvalho, M., & HC-FMUSP-Obstetric COVID-19 Study Group. (2024). Severe COVID-19 in pregnant women: Analysis of placental features and perinatal outcomes. *American journal of clinical pathology*, aqae072. Advance online publication. <https://doi.org/10.1093/ajcp/aqae072>
- Fajardo-Martinez, V., Ferreira, F., Fuller, T. et al. Neurodevelopmental delay in children exposed to maternal SARS-CoV-2 in-utero. (2024) *Sci Rep* 14, 11851. <https://doi.org/10.1038/s41598-024-61918-2>
- Gacci M., Coppi M., Baldi E., Sebastianelli A., Zaccaro C., Morselli S., Pecoraro A., Manera A., Nicoletti R., Liaci A., et al. (2021). Semen impairment and occurrence of SARS-CoV-2 virus in semen after recovery from COVID-19. *Hum. Reprod*. 36:1520–1529. doi: 10.1093/humrep/deab026.
- Gross RS, Thaweethai T, Kleinman LC, et al. (2024). Characterizing Long COVID in Children and Adolescents. *JAMA*, 332(14):1174–1188. doi:10.1001/jama.2024.12747

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