Long-COVID: Risks and Difficulties That Come with Post-Infection.

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In late 2019/early 2020 an outbreak of SARS-CoV-2 virus otherwise known as Coronavirus or COVID-19, spread throughout the entirety of the world, causing major economic and societal shutdowns that slowed commerce and general way of life. By December 2020, the first rollout of vaccines were being distributed to certain nations across the world. However, despite the distribution of life-saving vaccines, COVID-19 continued to mutate into worse and worse iterations of itself, such as the Omicron variation that spread in early 2021 and ensuing Delta and Alpha mutations that spread in following years. According to data from the World Health Organization, as of this year, there have been about 778 million COVID-19 infection cases worldwide, with 103 million infection cases in the United States alone; within the past 28 days there have been 105 thousand cases of infection worldwide. COVID-19 persists as a pandemic throughout the world, however, there has been an under-looked and disregarded result of COVID-19 that has the possibility to affect every person who has ever caught and experienced the disease; Long-COVID. Long-COVID, named so as it is a product of COVID-19 infection, is a post-viral illness that can take the form of many different ailments which has led the many infected and now living with post-viral disability struggling to get proper care and support within the healthcare system worldwide. Long-COVID is a rising risk for all those infected by COVID-19 in the past and should be taken seriously as a danger to the world's public health, as it is now the leading cause of disability in young children, causes brain-stem damage and specific tissue damage, and holds a similar severity to HIV/AIDS.

According to JAMA Pediatrics, about 10-20% of children are affected by Long-COVID, this amounts to about 6 million children affected which is higher than the number of children

with asthma, which before Long-COVID was the most prevalent disability diagnosed in children. This comes with the alarming knowledge that COVID-19 and Long-COVID have only existed as serious infections for five years whereas the earliest record of asthma comes from China in 2600 BCE. This overtaking of diagnosed disability in children comes with a significant cost to future generations. Precisely because the exploratory research the world has conducted on Long-COVID is only five years old, we, the world, don't know what negative long-term effects will occur to children who grow up with the disease. However, we do know some information on childhood infection, and it is not very good. According to a study published in the *Korea Biomedical Review,* "functional prediction analysis revealed that crucial immune signaling systems protecting the body were not functioning properly in infants and young children with Covid-19" (Covid-19 destroys even beneficial bacteria in infants' guts when their immunity develops: study, Soo-youn, Dong-hyun, Byung-ok). When a child is infected with COVID-19 either within the womb or at a crucial young age, their innate immune system is weakened which also creates "a reduced ability to eliminate viruses." In essence, a baby becomes more susceptible to all sorts of illnesses that they may otherwise have natural defenses against. This also could lead to "changes in the gut environment during infancy and early childhood can impact long-term health and immune development." Another study of Long-COVID in children released in *The Lancet*, an infectious diseases journal, lays out the implications of a wider health epidemic in children: "Children with long COVID often have symptoms that prevent them from attending school, playing sports, or socializing—fundamental parts of childhood development. A generation of children missing these milestones could have long-term economic and psychological impacts for society" (Long COVID is here to stay—even in children, Danilo Buonsenso). Essentially, the effects of Long-COVID in children are a great negative to social

development on top of the dangers to long-term health and wellness. Children, extremely vulnerable to illness, are not the only ones susceptible to long-term disability and negative development.

Not only are children at risk of long-term effects of COVID-19 infection, but adults of all ages are too. Due to COVID-19 still being a nouveau virus, the concise evidence of its negative effects are still being discovered, likewise the study of Long-COVID is equally new and under-researched, but the data we do have is quite concerning. In a study done jointly by the universities of Cambridge and Oxford, "researchers hypothesized these [COVID-19] symptoms were in part the result of damage to key brainstem nuclei, damage which persists long after Covid-19 infection has passed" (Brainstem damage found to be behind long-lasting effects of severe Covid-19). In short, COVID-19 and in effect, Long-COVID, both damage the brain and persist in damaging it long after the infection has passed. Alongside the brain, the body is quite affected as well; a study published in *Scientific Reports* recently revealed that Long-COVID can affect muscle structures within the body and infection can weaken specific muscles to the point of injury. Additionally, "the pathophysiology of COVID-19 in the peripheral nervous system is linked to immune dysregulation and hyperinflammation" (Almeida, Ferreira, Cipriano, Costa, Vas, Babault, Marqueti, Durigan). Which can cause further health issues in adults and children such as organ damage or failure. Unfortunately, Long-COVID can cause extreme issues in all types of people, leading some researchers to compare it to even more dire diseases.

A recent article released by the World Health Network describes some of the dangers of Long-COVID, stating that "[COVID-19] also has the capacity to inflict damage on the heart, kidneys, liver, and even the brain. The virus can cause blood clotting which can in turn cause strokes and heart attacks" (Šalamon, Bar-Yam, Heino, Bertram. Bilodeau, Fox). Another study,

released in Nature Communications, produced data on how Long-COVID can worsen muscle abnormalities and cause post-exertional malaise (Appelman, Charlton, Goulding, Kerkhoff, Breedveld, Noort, Offringa, Bloemers, van Weeghel, Schomakers, Coelho, Posthuma, Aronica, Wiersinga, van Vugt, Wüst). Most damning of all is the recent study from the scientific journal AJPM Focus that compares the differences and similarities between COVID-19/Long-COVID and HIV/AIDS. The study concluded that "a common outcome in both HIV and SARS-CoV-2 infections is increased vulnerability to infections. Immune function after COVID-19 infections is characterized by increased risks of infections including a greater risk of antibiotic-resistant infections compared to influenza and emerging evidence for opportunistic, AIDS-defining infections like various mycoses…" (Salamon, Kruger, Lupton, Pretorius, Ewing, Bar-Yam). There is a definite link between HIV/AIDS and COVID-19/Long-COVID in terms of decreased quality of life and persistent illness. In fact, the study concluded that those suffering from Long-COVID had a "reduction in quality of life…comparable to those with stage 4 cancers."

What about those who say that long-COVID isn't real and that COVID-19 is just like a mild cold? True, the world opened back up in 2021, and restrictions were eased and then practically erased. Most people who are infected with COVID-19 now claim that it's like the flu, a mild illness that doesn't do much. People might get a head cold, lose their sense of smell for a small amount of time, and be stuck at home for as long as a week. Those types of things don't seem to be the hallmarks of something that could turn into a debilitating illness. But that "little cold" that someone can have can be caught again and again, and as the data has begun to prove, repeat infection always carries the risk of Long-COVID and long-term complications. Things like loss of smell for a short period of time may seem harmless but "Infection can reduce gray matter mass which is associated with cognitive decline, decreases in IQ scores even after mild,

„resolved“ infection, increased risk of psychiatric disorders, and exacerbation of dementia. Loss of smell and taste is associated with behavioral, functional, and structural brain alterations” (Salamon, Kruger, Lupton, Pretorius, Ewing, Bar-Yam). That reinfection that may seem like a small cold, if caught enough times “increases the risk of these severe outcomes. Studies have shown that subsequent reinfections can compound the health risks. This accumulation of damage results in an increased prevalence of chronic health problems and disability within the population” (Šalamon, Bar-Yam, Heino, Bertram. Bilodeau, Fox). In effect, once you’ve had it, the risk is there, and it is always smarter to mitigate and avoid the risk instead of “tempting fate.”

What can we do in the face of a future of Long-COVID? Unfortunately, there is no simple answer. As cases continue to rise, much higher infections from the initial outbreak in 2020, we must try to be vigilant and care for one another. COVID-19 primarily spreads through aerosol droplets or the air and breath, to prevent catching it there are ways to clean the air and prevent the overall spread. People can buy air purifiers that clean up particulates in enclosed spaces and clean the air in general. People can host gatherings outside or in high ceilinged places that provide lots of clean air and space. People can also and most importantly, mask in enclosed spaces such as classrooms and offices. The future of Long-COVID is yet unknown, but it is always better to be informed than ignorant.

Works Cited

Soo-youn, Song. “Covid-19 Destroys Even Beneficial Bacteria in Infants’ Guts When Their Immunity Develops: Study.” *KBR*, 29 Aug. 2025, www.koreabiomed.com/news/articleView.html?idxno=28783.

Published under the Korea Medical Review, the article summarizes the research findings of “Altered Gut Microbiota and Predicted Immune Dysregulation in Early Childhood SARS-CoV-2 Infection.” 출처 : KBR(https://www.koreabiomed.com)” a journalistic study of the microbiome of infant children infected with COVID-19 and the resulting effects on their health. The article summarizes that children infected with COVID-19 experience” significant reductions in their gut microbiome, the resulting changes weakening the child’s immune system significantly and setting them up for long-term disability and continual health risks as they age”. In examining all articles, I wanted to find scientific publications that would inform my arguments using fact.

Long Covid Is Here to Stay—Even in Children - the Lancet Infectious Diseases, www.thelancet.com/journals/laninf/article/PIIS1473-3099(25)00496-7/fulltext. Accessed 19 Nov. 2025.

The Lancet, an accredited scientific journal on infectious diseases, summarizes the results of a study in which data from 40 children’s hospitals across the US were analyzed and disseminated. In the findings, it was concluded that Long COVID, a post-COVID infection classified as a disability, is overtaking asthma as the leading disability in young children. Symptoms of long COVID in children are potentially limiting and restricting emotional, physical and social development in children. Additionally, the article concludes that long COVID can come about from any infection or re-infection from COVID, providing an incredible risk to children as they grow. The importance of using accredited scientific articles is not lost on me and as a result I tried to use as many academic journals as possible to aide my argument.

Appelman, Brent, et al. “Muscle Abnormalities Worsen after Post-Exertional Malaise in Long Covid.” *Nature News*, Nature Publishing Group, 4 Jan. 2024, www.nature.com/articles/s41467-023-44432-3.

The article from Nature Communications, a scientific journal, outlines the results of a study of a healthy cohort and cohort of long COVID patients and their bodily reactions to sustained exercise. In the conclusion of the study, the article states that the effect of post-exercise malaise on the long COVID patient comes from high-fatigable glycolytic fibers and lower mitochondrial function, with a possible additional limitation of a lower capillarization and the ventilatory system. This article helps provide additional evidence to the rising threat of long COVID and its effect on the overall span of the body.

da Silva Almeida, Isabella, et al. "Persistent Neuromuscular Disorders Associated with Changes in Tibialis Anterior and Gastrocnemius Lateralis Muscle Architecture in Long-Covid: An Observational Longitudinal Study." *Nature News*, Nature Publishing Group, 2 Oct. 2025, www.nature.com/articles/s41598-025-17126-7.

This article, from Nature Communications, explores the study results of those suffering the effects of long COVID from mild to severe categorizations from ages 18-80 over the course of a single year. The results of the study conclude that several muscles in the body of those infected with long COVID are affected detrimentally and restrict the ability of movement and general locomotion in patients. This article is especially relevant to those who participate in sports as the muscles mentioned in the article are critical to certain types of activities.

"Brainstem Damage Found to Be behind Long-Lasting Effects of Severe Covid-19." *News*, 8 Oct. 2025, www.news-medical.net/news/20251008/Brainstem-damage-found-to-be-linked-to-long-lasting-effects-of-severe-Covid-19.aspx.

From the University of Cambridge, results of a study of 30 patients infected with COVID at the very beginning of the pandemic reveal that COVID has a marked effect on the brain including damage to key brainstem nuclei that persists after the initial COVID infection has run its course. There were also some ties to psychiatric effects including increased rates of anxiety and depression in those infected with

COVID-19. These findings help connect the average person unconnected to the effects of COVID and provide a good summarization of some effects of the illness.

Covid-19 Is "Airborne AIDS": Provocative Oversimplification, Emerging Science, or Something in between? - AJPM Focus, www.ajpmfocus.org/article/S2773-0654(25)00146-4/fulltext. Accessed 19 Nov. 2025.

The study from AJPM Focus, a scientific journal, compares the differences and similarities between the long-term post-infection effects of HIV/AIDS and COVID-19/long COVID. The study concludes that due to T-cell depletion, infection including opportunistic, accelerated biological aging, neurological, and systemic damage provide parallels in terms of AIDs in the broader immunological context. Meaning that the similarities are there and relevant to the longer-term discussion around the effects of long COVID as a post-viral illness. The extensive research of this journalistic article provides some critical information on the severity of my topic in a very informative way.

Šalamon, Špela, et al. "No Amount of Hand-Washing Can Make Covid-19 a Seasonal Virus." *WHN*, 15 Aug. 2024, whn.global/scientific/no-amount-of-hand-washing-can-make-covid-19-a-seasonal-virus/.

A succinct publicly accessible summary of the myths around COVID-19 and how the virus spreads. The article continues and describes the complications that can come from post-COVID infection i.e. long-COVID and how great the risks can be. This article has a wonderful explanatory image that helps highlight the severity of COVID infection.