

Long-Term Health Effects of COVID-19

Disability and Function Following SARS-CoV-2 Infection

Since the onset of the coronavirus disease 2019 (COVID-19) pandemic in early 2020, many individuals infected with the virus that causes COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), have continued to experience lingering symptoms for months or even years following infection. Long COVID—one of many terms commonly used to refer to persistent new or worsening health effects following acute infection—manifests as hundreds of symptoms in many different body systems (see Figure 1).

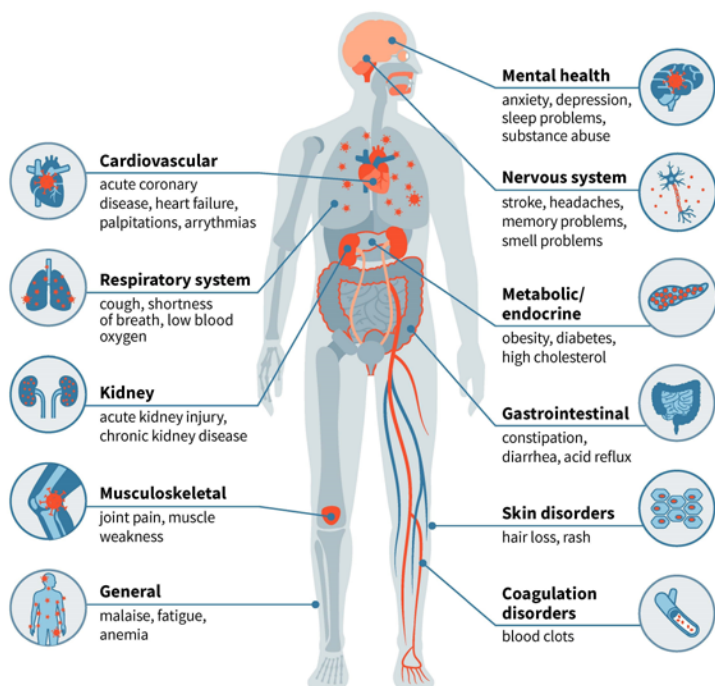
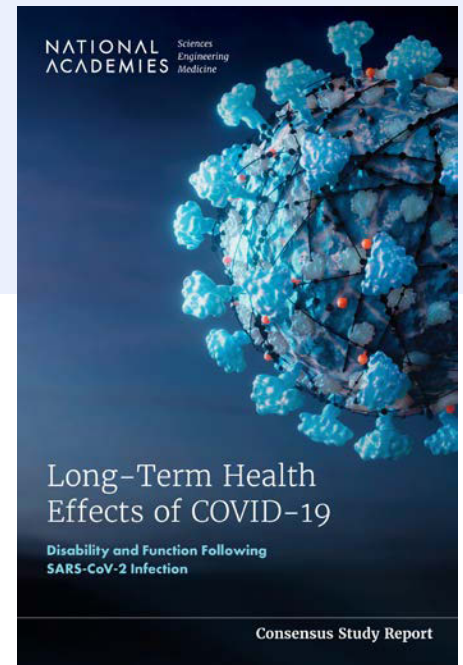


FIGURE 1 Lasting impact of COVID-19.
SOURCE: Washington University School of Medicine in St. Louis.

Some health effects of Long COVID, such as chronic fatigue and post-exertional malaise, cognitive impairment (sometimes referred to as brain fog), and autonomic dysfunction (a dysfunction of the nerves that regulate nonvoluntary body functions such as heart rate and breathing), can affect a person's ability to work or attend school for an extended period of time.

Data from the National Health Interview Survey of the U.S. Centers for Disease Control and Prevention show that in 2022, 6.9 percent of U.S. adults and 1.3 percent of children had Long COVID at some point, representing a large disease burden. The population of people with Long COVID is of special interest to the Social Security Administration (SSA) because the condition may contribute to their ability to meet SSA's criteria for disability.

Consequently, in 2022, SSA requested that the National Academies convene a committee of relevant experts to examine and provide an overview of the current status of diagnosis, treatment, and prognosis of long-term health effects related to Long COVID. Experts included epidemiologists, immunologists, pediatricians, neurologists, cardiologists, neuropsychologists, occupational therapists, and psychiatrists. In addition to reviewing the literature, the committee heard from individuals with lived experience of Long COVID. The committee's report, *Long-Term Health Effects of COVID-19: Disability and Function Following SARS-CoV-2 Infection*, presents conclusions in the following areas: (1) diagnosis, (2) epidemiology, (3) health effects, (4) functional impact and risk factors, (5) Long COVID in children and adolescents, (6) disease management, (7) disease course and prognosis, (8) health equity, and (9) similar chronic conditions.

It is important to note that while this report specifically addresses potential disability and effects on functioning following SARS-CoV-2 infection, a separate National Academies study committee concurrently worked to recommend a new definition for Long COVID.

REPORT CONCLUSIONS

Based on its review of the literature, the committee reached the following conclusions:

- 1. Long COVID is a complex chronic condition caused by SARS-CoV-2 infection that affects multiple body systems. Because of wide variability in testing practices over the course of the pandemic, many people experiencing Long COVID have not received a formal diagnosis of prior SARS-CoV-2 infection. A positive test for SARS-CoV-2 is not necessary to consider a diagnosis of Long COVID.*
- 2. The risk of Long COVID increases with the severity of acute infection. By the committee's best estimate, people whose infection was sufficiently severe to necessitate hospitalization are 2–3 times more likely to experience Long COVID than are those who were not hospitalized, and among those who were hospitalized, individuals requiring life support in the intensive care unit may be twice as likely to experience Long COVID. However, people with mild disease can also develop Long COVID, and given the much higher number of people with mild versus severe disease, they make up the great majority of people with Long COVID.*
- 3. Long COVID is associated with a wide range of new or worsening health conditions impacting multiple organ systems. Long COVID can cause more than 200 symptoms and affects each person differently. Attempts to cluster symptoms have yielded heterogeneous results.*
- 4. Long COVID can result in the inability to return to work (or school for children and adolescents), poor quality of life, diminished ability to perform activities of daily living, and decreased physical and cognitive function for 6 months to 2 years or longer after the resolution of acute infection with SARS-CoV-2. Increased number and severity of long-term health effects correlates with decreased quality of life, physical and mental functioning, and ability to participate in work and school. Health effects that may not be captured in SSA's Listing of Impairments yet may significantly affect an individual's ability to participate in work or school include, but are not limited to, post-exertional malaise and chronic fatigue, post-COVID-19 cognitive impairment, and autonomic dysfunction.*

5. Although the large majority of children recover fully from SARS-CoV-2 infection, some develop Long COVID and experience persistent or intermittent symptoms that can reduce their quality of life and result in increased school absences as well as decreased participation and performance in school, sports, and other activities. Overall, the trajectory for recovery is better among children compared with adults. More research is needed to understand the long-term functional implications of Long COVID in children, as information from adult studies may not be directly applicable.

6. There currently is no curative treatment for Long COVID itself. Management of the condition is based on current knowledge about treating the associated health effects and other sequelae. As with other complex multisystem chronic conditions, treatment focuses on symptom management and optimization of function and quality of life.

7. Recovery from Long COVID varies among individuals, and data on recovery trajectories are rapidly evolving. There is some evidence that many people with persistent Long COVID symptoms at 3 months following acute infection, including children and adolescents, have improved by 12 months. Data for durations longer than 12 months are limited, but preliminary data suggest that recovery may plateau or progress at a slower rate after 12 months.

8. Social determinants of health, such as socioeconomic status, geographic location, health literacy, and race and ethnicity, affect access to health care. With respect to acute SARS-CoV-2 infection and Long COVID, adverse social determinants of

health have contributed to disparities in access to SARS-CoV-2 testing; vaccination; and therapeutics, including treatments for acute infection and specialized rehabilitation clinics for Long COVID. In addition, the demand for specialty care exceeds capacity, resulting in waitlists for the receipt of services.

9. Complex, infection-associated chronic conditions affecting multiple body systems are not new, and Long COVID shares many features with such conditions as myalgic encephalomyelitis/chronic fatigue syndrome, fibromyalgia, and postural orthostatic tachycardia syndrome. Current theories about the pathophysiology of these conditions include immune dysregulation, neurological disturbances, cardiovascular damage, gastrointestinal dysfunction, metabolic issues, and mitochondrial dysfunction. More research is needed to understand the natural history and management of complex multisystem chronic conditions, including Long COVID.

LOOKING AHEAD

The COVID-19 pandemic continues to be a complex event in human history as the virus mutates and new vaccines and antiviral treatments are developed. Scientific consensus about the virus—and new or worsening health effects following acute infection—is still in its infancy. Information to inform SSA and other government agencies will evolve as more is understood about the virus and its long-term health effects.

To learn more about this report, visit www.nationalacademies.org/long-covid-disability.

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FOR MORE INFORMATION

This Consensus Study Report Highlights was prepared by National Academies staff based on the Consensus Study Report *Long-Term Health Effects of COVID-19: Disability and Function Following SARS-CoV-2 Infection* (2024).

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Health and Medicine Division

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