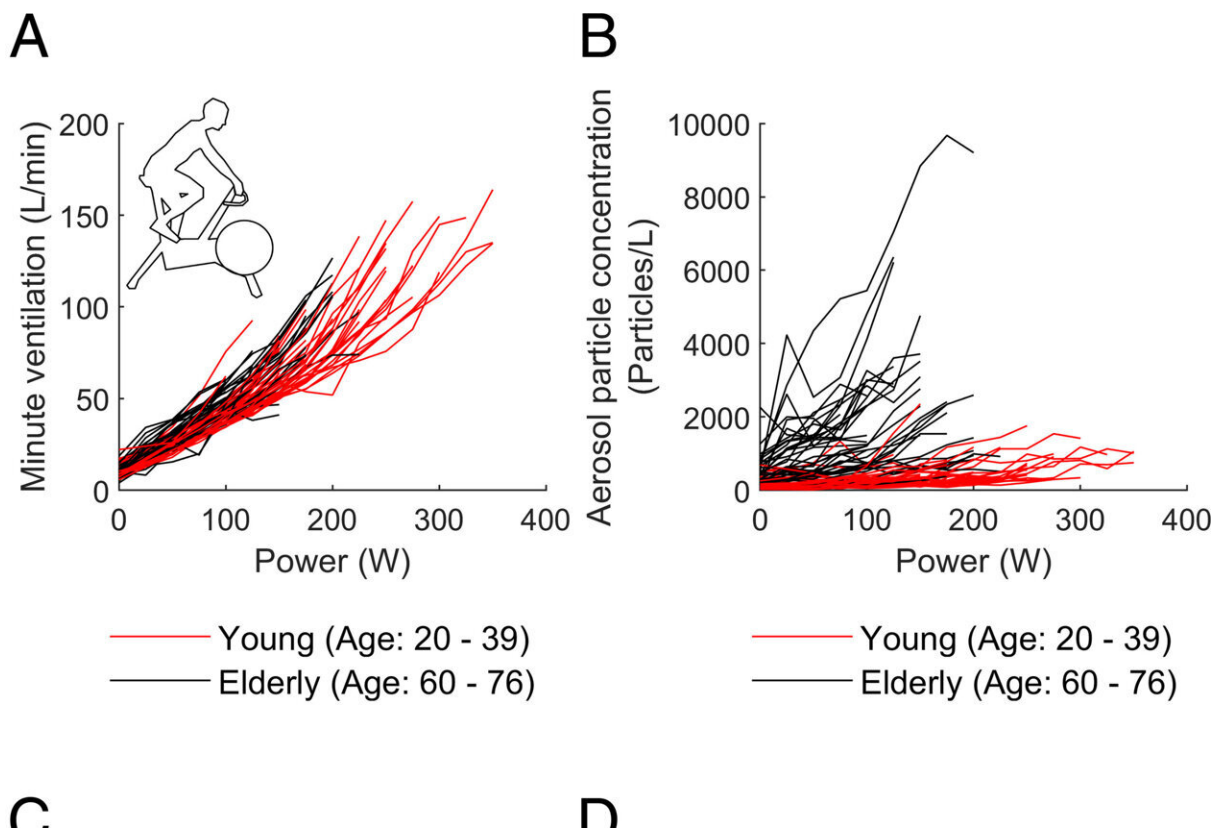


# Older folks found to foist more moist particles into the air

June 9 2023, by Justin Jackson



(A) ventilation versus power; (B) aerosol particle concentration versus power; (C) aerosol particle emission versus power; (D) aerosol particle emission versus relative power. (A–C) All data points from rest (power = 0 W) and for each step of the graded exercise test. The two age groups are marked by different colors illustrating the marked dependence of the aerosol particle concentration on age for both resting conditions and exercise. (D) Mean aerosol particle emission and 95% CI versus normalized power for each combination of age and sex. Values were derived from the individual log-linear regression fits. Relative power of 0%

corresponds to resting conditions and relative power of 100% to individual maximal exercise power. Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2301145120

Research led by the Department of Aerospace Engineering, Institute of Fluid Mechanics and Aerodynamics, Universität der Bundeswehr München, Germany, has found unexpectedly high aerosolized respiratory particle emissions from people over 60 years old.

In their paper, "Lung [aerosol](#) particle emission increases with age at rest and during exercise," published in *PNAS*, the researchers detail their findings after testing 80 individuals with a recently improved method of measuring respiratory aerosol particle emission.

Airborne respiratory diseases are transmitted via viruses in respiratory aerosol particles. When a person breathes out, a high-speed stream of air rushes over the surface of the wet lining of the respiratory tract, and some of this moisture is aerosolized and carried out with the exhale. Particles within the lining hitch a ride on the exiting moisture containing a mix of salts, proteins, mucus, and potential pathogens of bacteria and viruses.

Typically the emission of aerosol particles can increase by more than 100-fold from rest to peak exercise, and with the increase, the risk of infection can rise by more than 10-fold. While testing their improved measuring method, the researchers found another significant parameter affecting the amount of particle spread—age.

Subjects aged 60 to 76 years old emitted over twice as many aerosol particles at rest and during exercise and five times as much aerosol volume. This suggests that aerosol particle emission increases when the

respiratory system ages.

At rest, the expired air of older subjects (60-76) contained an average respiratory aerosol particle concentration of 310 particles/L compared to 105 particles/L in younger subjects. The study found differences between elderly men and women, with elderly men emitting 210 particles/L compared to elderly women at 500 particles/L. While the elderly women had more than twice the particle load per liter of air, the [elderly men](#) ventilated 57% more volume than [elderly women](#) making the overall difference insignificant.

The difference was more significant during [exercise](#) as the young group averaged 620 particles/L while the elderly group reached an average of 2,090 particles/L.

While age significantly affected aerosol particle emission, sex and body mass index differences were not significant. The study highlights that one size may not fit all when planning mitigation measures, especially for indoor fitness facilities or elder care facilities during heightened infection waves or future pandemics.

**More information:** Benedikt Schumm et al, Lung aerosol particle emission increases with age at rest and during exercise, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2301145120](#)

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