PFAS levels lower in buildings with healthier furnishings

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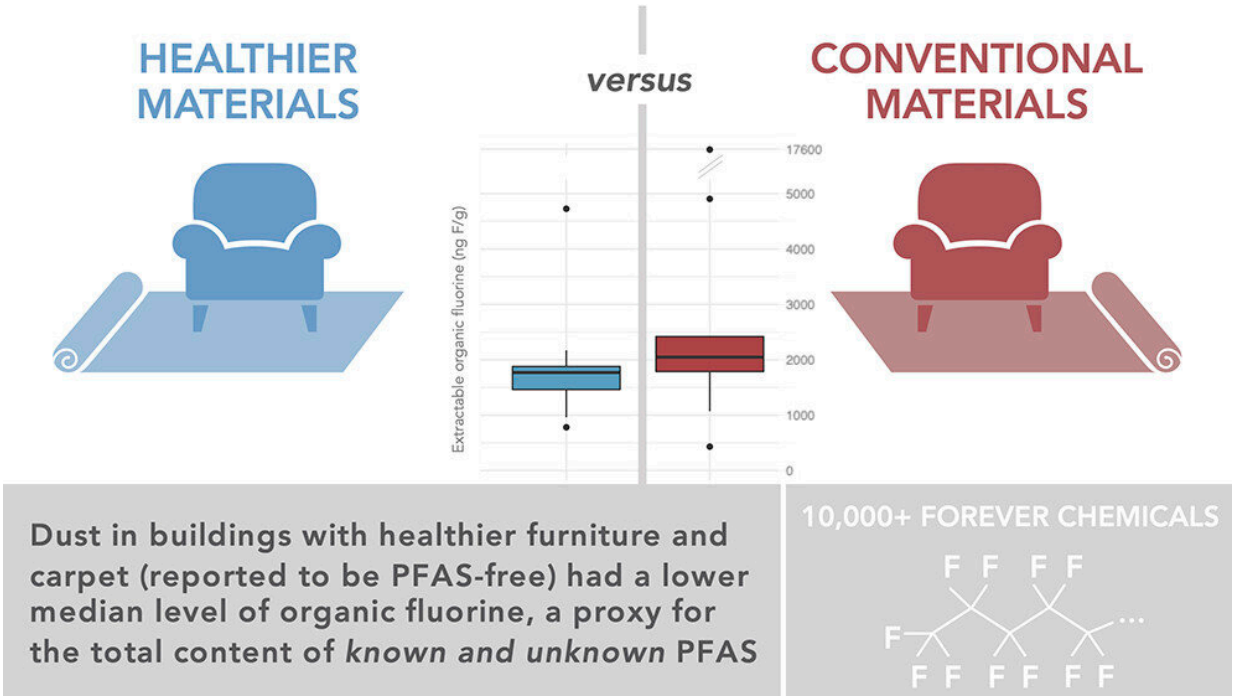

Graphical abstract. Credit: *Environmental Science & Technology* (2022). DOI: 10.1021/acs.est.2c05198

Buildings renovated with healthier furnishings had significantly lower levels of the entire group of per- and polyfluoralkyl substances (PFAS)—toxic chemicals linked with many negative health effects—than buildings with conventional furnishings, according to a new study led by Harvard T.H. Chan School of Public Health.

The study was published in *Environmental Science & Technology*.

"We have decades of research showing that PFAS are concerning for human health and the environment. Our findings provide desperately needed scientific evidence for the success of healthier materials—which don't have to be more expensive or perform less well—as a real-world solution to reduce indoor exposure to forever chemicals as a whole," said Anna Young, research associate in the Department of Environmental Health, associate director of the Healthy Buildings program, and lead author of the study.

PFAS—dubbed "forever chemicals" because of their extreme persistence in the environment due to their characteristic fluorine-carbon backbone—are artificial compounds widely used for their stain-resistant and water-resistant properties.

There are at least 12,000 different types of PFAS, and they are found in products such as furniture, carpet, textiles, food packaging, nonstick cookware, cosmetics, firefighter gear, and firefighting foam. PFAS have been detected in the blood of over 98% of Americans.

Health problems linked with PFAS exposure include thyroid disease, stunted development, weakened immune system, high cholesterol, testicular cancer, obesity, and diabetes. However, there is very little published research on the effectiveness of actionable solutions to reduce indoor exposure to forever chemicals.

To assess indoor PFAS levels, Young and her colleagues analyzed dust in buildings on a university campus. In previous research, they'd found that levels of 15 types of PFAS were lower in buildings with healthier materials. But in the new study, they wanted a way to measure all types of PFAS, because the vast majority of the thousands of PFAS in use are unknown or cannot be measured using traditional lab techniques. As a

novel surrogate to measure PFAS, they used organic fluorine, which is found in all PFAS.

Comparing 12 indoor spaces with healthier carpet and furniture to another 12 spaces with conventional furnishings, the researchers found that PFAS concentrations in dust were 66% lower in the 12 rooms with healthier materials compared to the 12 rooms furnished without particular attention to PFAS. Organic fluorine levels were also lower in the healthier spaces, showing that renovating spaces with healthier furnishings succeeded in not only lowering the 15 PFAS traditionally investigated, but the entire class of forever chemicals.

The 15 types of PFAS that researchers could measure in the lab were significantly correlated with organic fluorine concentrations, but only accounted for up to 9% of it—suggesting the likely presence of many unidentified PFAS in the dust.

The researchers stressed that it's important for manufacturers to eliminate entire groups of unnecessary toxic chemicals such as PFAS from furnishings, and to make healthier furniture and carpet materials the norm. Manufacturers should also provide fully disclosed third-party-verified chemical ingredient lists for these "healthier" materials, the authors said.

"This study addresses a key question: If we demand products without any forever chemicals, do we see a reduction in total PFAS beyond the usual 15 measured in a lab?" said Joseph Allen, associate professor of exposure assessment science, director of the Healthy Buildings program, and senior author of the study. "The answer is unequivocally, yes."

More information: Anna S. Young et al, Organic Fluorine as an Indicator of Per- and Polyfluoroalkyl Substances in Dust from Buildings with Healthier versus Conventional Materials, *Environmental Science &*

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