# Textile scientists offer fresh insights on why some clothes get smellier

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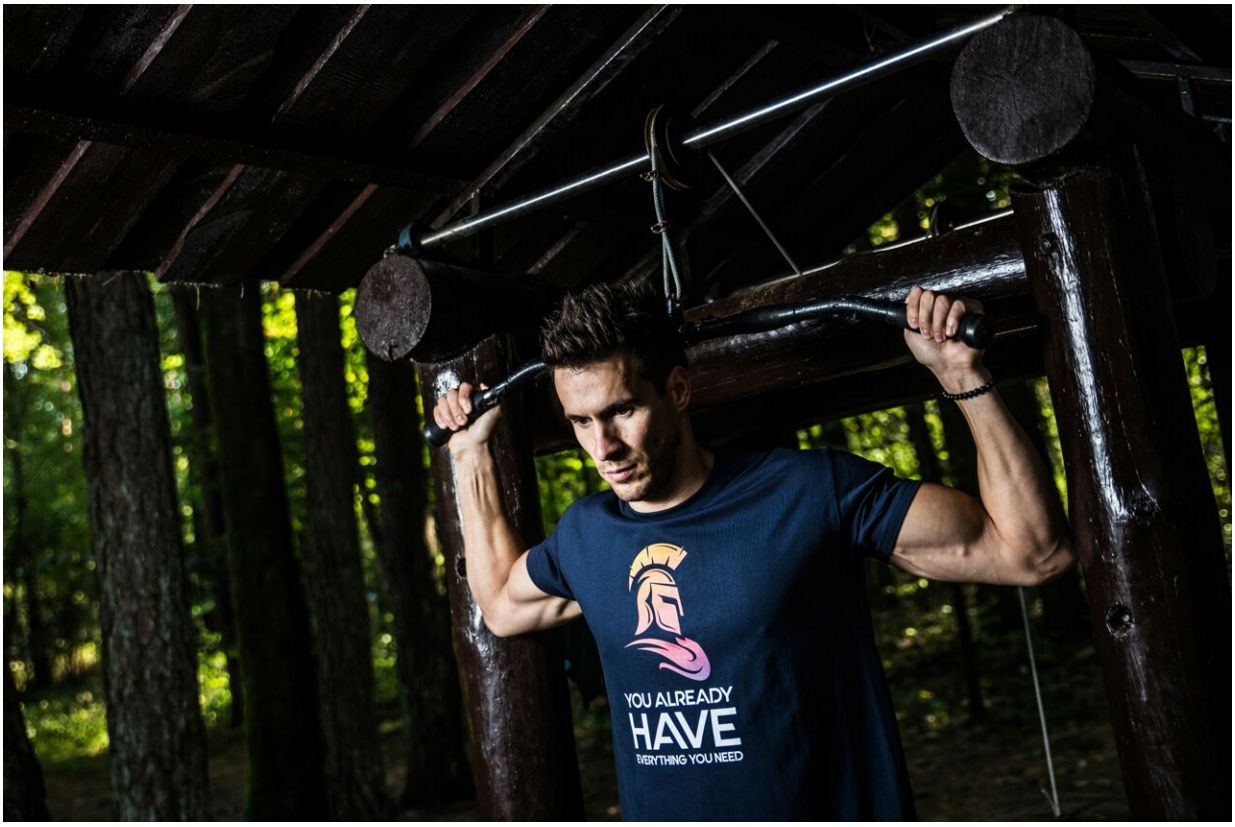


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Ever noticed that a polyester T-shirt is smellier than a cotton one after you work out? New University of Alberta research now shows why.

Analysis of various fibers soaked in a solution of simulated sweat showed that cotton and viscose, which are cellulosic, or plant-derived fibers, absorbed—and consequently released—smaller amounts of odor-causing compounds than polyester, nylon and wool.

The key finding from the study, published in the *Textile Research Journal*, explains why some commonly worn fibers are smellier than others when people sweat, says Rachel McQueen, a clothing and textiles scientist in the Faculty of Agricultural, Life & Environmental Sciences who conducted the research with colleagues from the University of Otago in New Zealand.

"Although we know that polyester is smellier after being worn next to sweaty armpits compared to cotton T-shirts, we haven't really known why. Now we have a better understanding of how odorants transfer and are selectively absorbed by various fiber types in sweat."

The study's method of using simulated liquid sweat also offers an important fresh approach to exploring the issue, she notes.

"Body odors commonly transfer to clothing through liquid sweat, but investigation of odor retention in textiles often neglects this route of exposure in test procedures," McQueen says, noting that standard scientific methods include examining only how the odor passes through the air to the textile. "If you had a sweaty armpit that never actually touched the shirt you're wearing, then the fabric wouldn't get very smelly.

"By studying the transfer of odorants to fabrics using a liquid sweat solution, we were able to give a more realistic insight into how these smelly compounds really get into our clothes."

In the study, the researchers soaked the fibers in the sweat solution for

different periods of time, then examined the release of various odor-causing compounds from those fibers using analytical equipment that can detect odorants in the air in real time—more like the human nose does.

Overall, the study showed that the cellulosic fibers took in lesser amounts of the compounds when transferred through the sweat solution than textiles made of wool, nylon and polyester fibers, which conversely, initially released higher amounts of the smelly compounds.

Sweat, which is mostly made up of water, also has oily compounds that bacteria transform to form odors, McQueen explains. "These oily compounds and odorants in the watery sweat can interact differently with textiles, depending on the fiber chemistry.

"While water-loving cellulosic fibers such as cotton and viscose absorb more of the water from sweat than polyester does, polyester doesn't want to absorb the water," McQueen notes. "It's more oil-loving, and it absorbs more of the odorants, which don't dissolve in water, and more of the oily compounds, which could also later break down and become smelly."

The results of the study help explain why clothing made of cellulosic fibers tends to be less smelly than synthetic clothing after being worn.

The research also showed that although nylon and wool initially took in a lot of the odorants from the sweat, they dissipated them more quickly than polyester. After 24 hours, wool and nylon had much lower intensities of the odorants and were more similar to the cellulosic fibers.

"That tells us that while polyester still needs to be washed, for nylon and wool garments, people might be able to freshen them by just airing them out rather than laundering every time."

Knowing more about why sweat makes some fibers stinkier can help consumers make more informed choices when shopping for their clothing, she says.

"This matters not just for exercise clothing, but for our day-to-day wear," she adds, noting that most of it is fast fashion containing polyester.

"Basically, if you're concerned about smelly clothes, then keep away from polyester. Even with some of the anti-odor claims on some clothing labels, you might want to be cautious. If the anti-odor property is due to an antimicrobial, it may not be as effective as you think, because there's another mechanism in play, which is all about the fiber chemistry and the interaction with odorants."

The study's findings could potentially also be useful for textile scientists and manufacturers, perhaps in developing polyester to be more water-loving and less attracted to oily compounds, she adds.

**More information:** Rachel H McQueen et al, Textile sorption and release of odorous volatile organic compounds from a synthetic sweat solution, *Textile Research Journal* (2024). DOI: 10.1177/00405175241249462

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