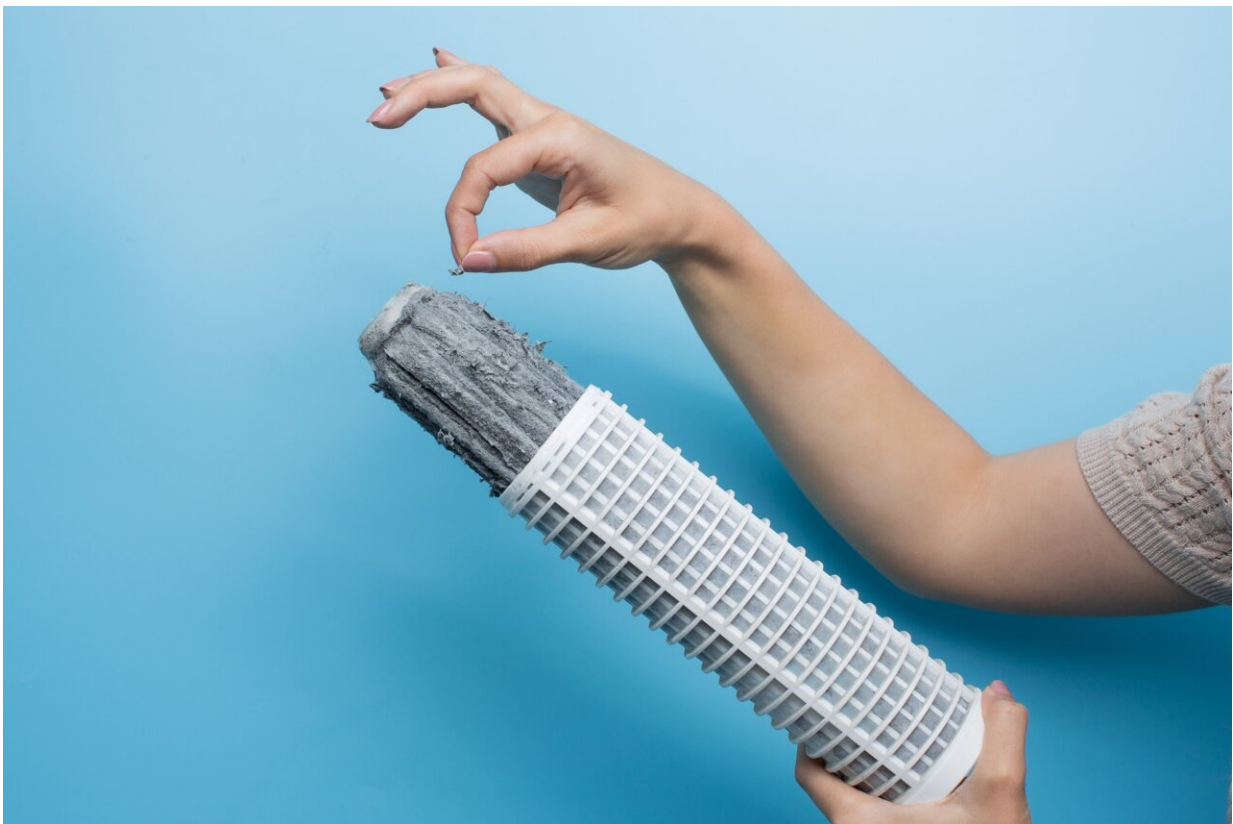


# Doing laundry by hand sheds just as many microfibers as machine washing—new research

October 24 2023, by Deirdre McKay, Kelly Sheridan and Thomas Stanton

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Between [6,500 and 87,000 tons](#) of microfibers are shed during domestic

laundering every year in the UK. Many of these minuscule fibers end up in rivers and oceans, with [devastating consequences](#) for aquatic animals and environments.

As a result, environmental advocacy groups in the [UK](#), [EU](#) and [North America](#) are campaigning for legislation to mandate microfiber-catching filters for all new washing machines.

But microfiber pollution isn't limited to machine washing. Our [new research](#) published in the *Journal of Cleaner Production* shows that washing clothing by hand can shed just as many microfibers as laundry washed in a machine.

This is an issue. More than half of the global population [doesn't have regular access to a washing machine](#) and so launder "off-grid," such as by hand. Hand washing laundry often involves a lot of scrubbing and abrasion that sheds fibers. Wastewater from hand laundering may flow directly into rivers or onto concrete and stone "laundry decks," bypassing wastewater treatment facilities even where such facilities are available.

Resolving the microfiber pollution problem necessitates more than just installing washing machine filters. It requires changes in how [textiles](#) are designed, manufactured and traded on a global scale.

## **Fibers shed from hand laundry**

Scientific research into fiber shedding often overlooks people that hand launder their clothes, with the predominant focus being on the fibers shed by conventional electric washing machines. Although scientists from countries where many people wash by hand [have observed](#) that these methods result in fiber shedding, they have seldom received the necessary support to measure or compare the quantity of fibers shed.

Our research was conducted with colleagues from Isabela State University in the Philippines, Wollongong University in Australia and seven other universities across the UK. We held a workshop and observed hand laundering practices in the Cagayan River Valley in the northern Philippines. We then replicated the hand laundering techniques demonstrated by the local community within a laboratory.

Our experiments measured the fibers shed from both pre-washed and brand-new 100% polyester trousers purchased from a UK high street store. These trousers closely resembled the polyester clothing we found in markets in the Philippines and the garments we observed being hand laundered there.

We found that hand washing these trousers using a plastic scrub brush led to fiber shedding levels of between [6,499 and 64,500](#) individual fibers per garment. This is comparable to the levels reported for machine laundering. It is evident that hand laundering is not necessarily gentler on textiles than machine laundry.

## **Measuring 'shedability'**

People who hand wash their clothes employ various techniques. These are based on the textiles they are washing and the purpose an item of clothing serves. Clothing that is covered in dust or mud, like garments worn for farm work, may require vigorous scrubbing.

Our research could not recreate all of the ways people launder by hand. We were also unable to explore the impact of every textile variable on fiber shedding, including coloration method, dye type, specific knit or weave structure, and mechanical or chemical finishing.

Among the variables we did examine, our results demonstrated that the structure of the textiles had a more pronounced effect on fiber shedding

than the type of fiber itself. Fiber type had no significant influence on shedding. Notably, woven textiles shed fewer fibers compared to their knitted counterparts.

It's not just synthetic textiles that shed problematic fibers. Plant-based textiles like cotton and animal-based textiles such as wool shed fibers in [similar quantities](#) to plastic fibers. [Some research](#) even suggests that cellulose-based fibers such as cotton may impose comparable, if not more severe, consequences on organisms that ingest them when compared to synthetic microfibers.

Despite often being marketed as "biodegradable," cotton fibers [undergo modifications](#) for use in the textile industry that alter the structure of the cellulose they are composed of. Most cottons also have [chemical dyes](#) and finishes added during processing.

As a result, cotton textile fibers do not readily biodegrade in natural surroundings. And any degradation that does occur will probably release chemicals from their production into the environment. This holds true regardless of the laundering method used for the textiles.

## **Solving the microfiber problem**

Solving the issue of textile fiber shedding is complex. There is a massive global trade in used clothing, worth about [US\\$5 billion \(£4.1 billion\) per year](#). Even when care labels and fashion designers have considered electric machine washing, potential washing machine filters and wastewater treatment, the export of used clothing takes these textiles away from that established infrastructure.

But the people we observed hand washing clothing need the affordable and durable work attire that this used clothing trade provides. This means that, to address textile fiber shedding, we require a complete

rethink not only of the ways we launder our clothes, but of how clothing is made.

The [fundamental problem](#) lies not in the secondhand [clothing](#) trade, but in the design of textiles themselves. We could make headway in tackling the microfiber issue by designing low-shed fabrics to make garments that can better withstand the rigors of hand washing. Another approach is the development of [new truly biodegradable fibers](#) that will break down naturally in the environment.

In the meantime, those who pride themselves on avoiding synthetic fabrics should recognize that the microfiber problem [extends beyond the materials we wear](#). Textile marketing should not greenwash by conflating "natural" and "biodegradable." And relying on washing machine filters alone will not solve the problem of microfiber shedding.

**More information:** Thomas Stanton et al, Shedding off-the-grid: The role of garment manufacturing and textile care in global microfibre pollution, *Journal of Cleaner Production* (2023). [DOI: 10.1016/j.jclepro.2023.139391](#)

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