Northumbria University NEWCASTLE

Student Amber Cummins examining microfibers collected on the dryer lint filter

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“Sustainable” condenser tumble dryers create hundreds of tonnes of waterborne microfiber pollution

A new study has revealed that drying laundry using a condenser tumble dryer leads to hundreds of tonnes of potentially harmful microfibers being released into waterways and oceans across the UK and Europe.

Researchers from Northumbria University, worked in partnership with scientists at consumer goods giant Procter and Gamble on the study, which is published today (24 May) in the scientific journal PLOS ONE.

The team found that while condenser dryers may reduce the volume of airborne microfibers being released compared to vented dryers, they are still a significant contributor of waterborne microfiber pollution, with more than 600 tonnes of microfibers being poured down household drains.

Both types of tumble dryer produce microfiber pollution. Although recent studies have suggested that moving from vented tumble dryers to condenser dryers could reduce airborne microfiber pollution, their impact on waterborne microfiber pollution has been unknown until now.

While condenser dryers collect moisture from wet clothes into a container, rather than exhausting microfibers into the air as vented dryers do, the researchers found that condenser dryers in the UK and Europe still produce more than 7,200 tonnes of microfiber annually.

Although 91% of this is collected in the lint filter, which many consumers dispose of in their household waste, the remaining microfibers – a massive 641 tonnes, equivalent to the weight of more than 100 adult male African elephants – are collected in the condenser and poured down the drain. This makes condenser tumble dryers significant sources of microfiber water pollution.

However, some appliance manufacturers suggest that consumers should clean their lint filters under a tap. If consumers follow this guidance, it could lead to ten times more tonnes of microfibers entering our waterways. This means that the drying process is causing more waterborne microfiber pollution than the washing process.

To evaluate the environmental impact of condenser dryers, Professor John Dean, from Northumbria University's Department of Applied Sciences, worked alongside researchers at Procter & Gamble to test loads of new, clean garments as well as dirty laundry sourced from volunteers in Newcastle upon Tyne. They collected and analysed microfibers from several components of each type of dryer.

"We have for the first time focused on microfiber release from vented and condenser dryers using real consumer laundry loads," said Professor Dean, an expert in analytical science and environmental pollutants.

“It was found that most microfibers released from dryers is collected in the lint filter, thereby preventing release into the environment. However, when you realise that some manufacturers then recommend regular washing of the lint filter under a running tap, this contributes directly to an increase of waterborne microfibre pollution.

“After considering the environmental impact of current domestic household practices, a simple remedy is proffered. Instead of washing the lint filter under the tap after use in the tumble dryer, simply clean the filter either by hand, a light brush, cloth, or vacuum cleaner, and dispose of the collected fibres, as dry waste, in household waste. This simple and effective procedure can reduce microfibre release from tumble dryers and contribute to the protection of the global natural water environment.”

While extensive research has been carried out into the quantities of microfibers released down the drain by washing machines, historically, less has been understood about the release from tumble dryers.

However, in recent years, the spotlight has shifted from the washing machine to the tumble dryer because fibers also become released from textiles during the drying process.

The team is now urging theappliance industry, its trade associations, and legislators to recognise that all types of tumble dryer can be significant contributors to the problem of environmental microfiber pollution.

The researchers say that efforts are needed to mitigate this issue through revised usage instructions and improved appliance design.

Current plans to introduce microfiber filtration systems into washing machines are expected to reduce the environmental impact of that stage in the laundering process. This study suggests that similar approaches to tumble dryers is a logical next step.

Dr Neil Lant, a Research Fellow at P&G and their leading scientist on this study, added: “The contribution of washing machines to aquatic microfiber pollution has now been extensively studied and filtration technology is now being integrated into those appliances to mitigate the issue.

“Our recent work in collaboration with Northumbria University has recognised, for the first time, that the most important tumble dryer types used in Europe – condenser and heat pump – can also be significant contributors to aquatic microfiber pollution, especially if users wash lint filters in a sink.

“We do over 7 billion dryer loads in the UK and EU each year, with condenser dryers generating 7,200 tonnes of microfibre. We can prevent around 90% of that from causing water pollution by cleaning lint filters into household waste, but to deal with the rest we’ll need to redesign the air filtration systems in all types of dryers.”

Procter & Gamble has been working with analytical and forensic fibre science experts at Northumbria University for over six years to improve our understanding of microfibre release during washing and drying.

This is the first time that the consumer goods giant has worked on a joint academic and industrial project with a second-year undergraduate student at Northumbria University.

Amber Cummins, a student in the Department of Applied Sciences at Northumbria, worked alongside Professor Dean on this project and has now published her first research publication at just 22 years old.

Amber said: “By working on this project and investigating microfibre release from dryers I've gained a new set of skills and understanding of the forensic analytical techniques required to undertake research.

“As an undergraduate student in the Department of Applied Sciences, at Northumbria University; being able to work on a joint academic and industrial project with Professor Dean and P&G has been a unique and rewarding experience, with the bonus of publishing my first research publication in a top journal.

“I am also grateful for the support of Suzanne Lonsdale, Senior Technician in Forensic Science at Northumbria University, who provided not only collegiate support but technical forensic analytical skills that enabled me to analyse the microfibres by a range of microscopy techniques”.

Amber was supported in her research by the Worshipful Company of Launderers, a charitable and education trust which aims to gives scholarships for the further education of people pursing studies of benefit to the laundry industry.

Kenneth Cupitt, Master of the Worshipful Company of Launderers, said: “We are delighted that we have been able to provide a grant to Amber Cummins to carry out this research, which is in-line with the Company’s objectives. Such research is a valuable contribution to safeguarding the planet and mankind and a project of which The Worshipful Company of Launderers is proud to be supporting.”

The complete findings of this study, The Impact of Vented and Condenser Tumble Dryers on Waterborne and Airborne Microfiber Pollution, by Northumbria University in collaboration with Procter & Gamble, are now published in PLOS ONE.

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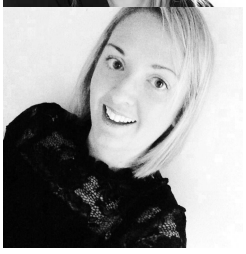

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