CASE STUDY

The water bottle stress test

How everyday handling affects microplastics in bottled water

Key Takeaway

Physical stress releases microplastics we can measure. Environmental stress may push them below what we can see.

The Question

Bottled water is one of the most widely consumed packaged products, and people handle, reuse, and store bottles in all kinds of real-world conditions. This pilot study (one brand, one run per scenario) simulated five common stress conditions to see what, if anything, they release.

The Impact

Every day handling via squeezing, shaking, sun, and heat exposure causes a plastic water bottle to shed microplastics. The effect varies sharply by stress type with physical stress releasing microplastics we can measure, and environmental stress pushing them below what we can see.

The Study

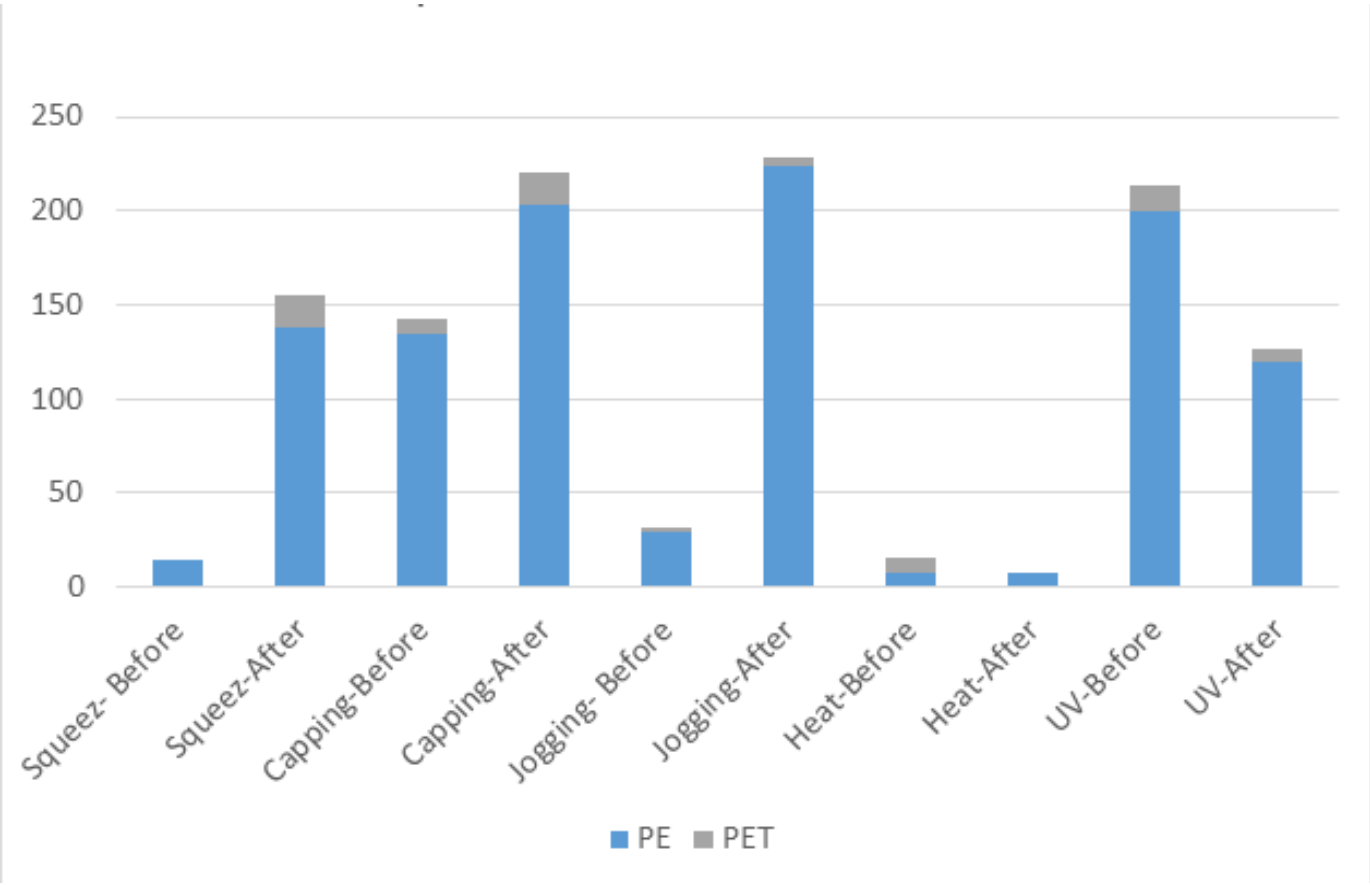
- Baseline: water filtered to particle-free (5 µm) before testing
- Poured back into the bottle, stress applied, then re-filtered with a new filter—so any particles found are attributable to the bottle or cap itself
- Scenarios: hand-pressing×10 (handling), cap open/close×10 (capping), shaking×100 half-full (shaking), UV exposure 2 days outdoors, heat exposure 2 days in a hot car (UV & heat both in upper 90s°F)

The Results

Stress type	Particles before	Particles after
Handling	14	203
Capping	7	17
Shaking	29	224
Heat	16	7
UV	217	128

Chart on following page

Microplastic Particles Before vs. After



NOTE | Pilot exploration only—one brand, one run per scenario. Not a definitive regulatory study; intended to demonstrate feasibility and start a conversation about real-world bottle behavior.