Potential Respiratory Effect from 3D Printers

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The Issue: More and more companies and consumers are adopting the use of 3D printers. Although these printers are known to emit ultrafine particles and volatile organic compounds, there is little available information regarding the health consequences of working with these machines.

Study Question: Is regular exposure to 3D printing (especially without personal protective equipment) associated with negative respiratory health outcomes?

Methods: We surveyed 46 workers at 17 locations to learn about their occupational details and health status (i.e. self-reported symptoms, diagnoses and family history). Locations included prototyping services, educational institutions and libraries.

Implications (see results on right): These findings suggest the need for additional research to identify whether formalized safety guidelines pertaining to 3D printer use are needed.

And to identify whether enclosed printing environments and use of respiratory protective equipment would likely be helpful to preemptively reduce printer emissions and prevent occupational injury.

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Results:

Working full-time (>40 hours per week) with 3D printers is significantly associated with negative health outcomes.

Among workers that used 3D printers:
•57% experienced respiratory symptoms more than once a week in the past year
•22% had physician-diagnosed asthma
•20% experienced headaches
•20% had cracked skin on hands

Few workers use personal protective equipment (PPE).

Among workers that used 3D printers:
•Only 48% used PPE
•37% used skin protection
•Use of respirators/masks was even lower: 35%

Injuries were also reported.

Among workers that used 3D printers:
•17% reported injuries
•Injuries were most often cuts/scrapes during printer operation

Workers reported exposure to the following printing materials (based on 22 of the 46 survey responses)**:**
•Polylactic acid (64%)
•Acronitrile butadiene styrene (27%)
•Nylon (23%)

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