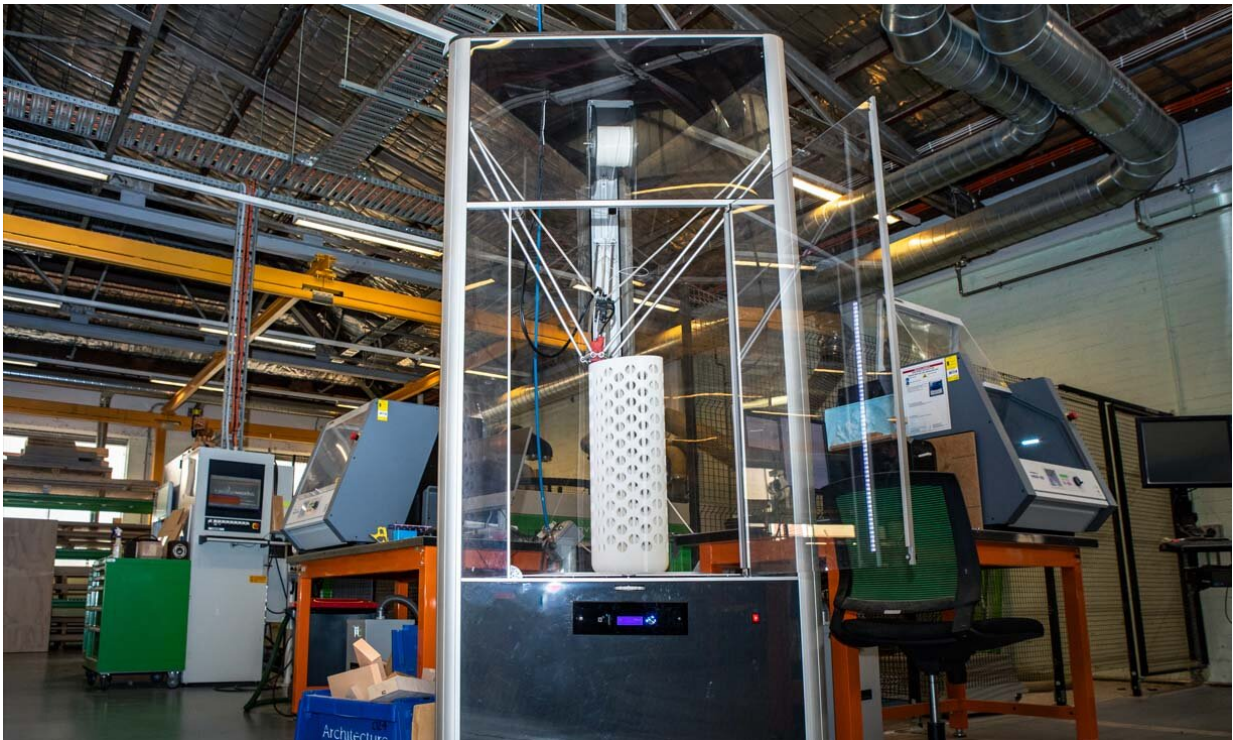# 3D digital technologies tackling mental injury prevention in health care

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3D printing machine in a workshop printing one of the privacy dividers. Credit: RMIT University

The **Safety Sensescaping** project is part of Peninsula Health's Thriving in Health program, which aims to create safe and mentally healthy environments for health care workers to thrive in.

Project lead and RMIT Senior Lecturer Dr. Olivier Cotsaftis worked with doctors, nurses and non-clinicians at Peninsula Health for three years to understand the psychosocial hazards in their workplace and find design-led solutions to prevent mental injury.

Cotsaftis said hospital scrubs were an unconscious source of stress for many health care workers.

Designed according to the standard male or female body, scrubs do not typically accommodate the wide range of body shapes and sizes.

Scrubs are also often made from scratchy synthetic materials, which can cause the wearer to overheat quickly.

"Many workers don't realize how being uncomfortable in scrubs can add extra stress to an already stressful job," said Cotsaftis, from RMIT's School of Design.

"Some workers we spoke to said their scrubs felt suffocating during highly stressful situations."

Cotsaftis said having comfortable scrubs that were tailored to an individual's body was an effective way to improve the mental health of workers.

"In a job where there is little control over what you do, feeling comfortable in your uniform and how you present yourself can help a person reclaim a sense of their identity," he said.

Nurse Erin Colgan wearing her 3D knitted scrubs as she works at the hospital. Credit: RMIT University

Starting with body scanning technology to map out the body's measurements, Cotsaftis then used 3D-knitting technology to create the scrubs.

Using yarn made from a blend of organic cotton and Seacell, an algae-based cellulose material, the final prototype was a breathable, comfortable and well-fitted set of scrubs, which were a hit with staff at Peninsula Health, said Cotsaftis.

Nurse Erin Colgan, who tested Cotsaftis' prototypes, said she was not aware of how negatively her generic navy scrubs impacted her mental health until she was involved in the Safety Sensescaping project.

"This project has made me understand the impact scrubs and uniforms have on mental health and I have decided to change how my scrubs make me feel," she said.

Cotsaftis is hoping to work with tech companies to fine-tune the 3D knitting and make the process more streamlined. He is also hoping to source new yarns made from organic waste to make the scrubs more sustainable.

Sound absorbing furniture

Cotsaftis said the demanding nature of health care work meant staff were often unable to take restful breaks as there were a lack of private resting spaces.

3D printed modular furniture in a workshop, featuring privacy dividers and two

"Many health care workers take breaks wherever they can, but there may not be any seats to sit on or they might lack privacy," he said.

"They're also subjected to lots of noise pollution, which makes it difficult for them to de-stress."

Working within these constraints, Cotsaftis designed a suite of portable, modular, cost-effective and sustainable 3D-printed furniture. The furniture could be printed on demand when needed by the hospital, and industrially composted at the end of its life. Most importantly, the furniture was sound absorbing, said Cotsaftis.

The prototypes were made from corn polylactic acid (PLA), a compostable and carbon-neutral natural plastic, and recycled paper for its sound-absorbent properties.

Cotsaftis' furniture design includes the use of rounded patterns, allowing sound to travel through the furniture rather than bounce off the surface.

Close up details of the 3D knitted scrubs. Credit: RMIT University

Preventing mental injury in health care

According to [WorkSafe](link), psychosocial hazards are factors in work that increase the risk of work-related stress, which can lead to psychological or physical harm.

Psychosocial hazards can range from low job control, poor environmental conditions to violent or traumatic events in the workplace.

WorkSafe Victoria Executive Director External Affairs Sam Jenkin said the Mental Health Improvement Fund supported initiatives that prevent work-related mental injury through system-level change.

"Thriving in Health's prevention-focused initiatives will share knowledge and resources to support more than 100,000 frontline health care workers across Victoria," Jenkin said.

"As a community we need to look after the workers who look after us, sadly health care workers face increased risk of mental illness and injury—especially those who provide frontline care."

"WorkSafe has accepted nearly 13,000 claims from the Health Care and Social Assistance sector in the past three financial years, with 17.7 percent of these for mental injuries."

Dr Olivier Cotsaftis smiling as he stands in front of his 3D printed furniture. Credit: RMIT University

Design—more than just aesthetics

Cotsaftis said his research with Safety Sensescaping highlights how human-centered design can change our approach to creating products, services, strategies and policies to tackle the growing issue of mental well-being in the workplace.

"Design is often misunderstood as form and aesthetic, but it also includes the broader systems we sometimes interact with, such as health care," he said.

"What we've designed is not just innovative scrubs or furniture, but a design strategy that can be used to tackle any work-related factors contributing to poor staff mental well-being in health care."

"[2023 Safety Sensescaping Research and Engagement Report](#)" and "Thriving in Health: Safety Sensescaping—A design approach to workplace [mental health](#)" were prepared for and published by Peninsula Health's Thriving in Health program.

The research was led by Dr. Olivier Cotsaftis from RMIT University in collaboration with Peninsula Health and supported by WorkSafe's WorkWell Mental Health Improvement Fund.

Provided by RMIT University