

Breathe: The shape-shifting ball that supports mental health

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Alexz Farrall holding PAWS. Credit: Vittoria D'Alessio, University of Bath

A soft ball designed to support mental health by 'personifying' breath has been invented by a computer science student at the University of Bath.

A soft ball that 'personifies' breath, expanding and contracting in synchronicity with a person's inhalations and exhalations, has been invented by a Ph.D. student at the University of Bath. The ball is

designed to support mental health, giving users a tangible representation of their breath to keep them focused and to help them regulate their emotions.

Alexz Farrall, the student in the Department of Computer Science who invented the device, said, "By giving breath physical form, the ball enhances self-awareness and engagement, fostering positive mental health outcomes."

Generally, breathing is an ignored activity, yet when done deeply and with focus, it's known to alleviate anxiety and foster well-being. Measured breathing is highly rated by [mental health practitioners](#) both for its ability to lower the temperature in emotionally charged situations and to increase a person's receptivity to more demanding mental-health interventions.

Disciplines that frequently include mindful breathing include Cognitive Behavioral Therapy (CBT), Mindfulness-Based Stress Reduction (MBSR), Dialectical Behavior Therapy (DBT) and trauma-focused therapies.

Most people, however, struggle to sustain attention on their breathing. Once disengaged from the process, they are likely to return to thinking mode and be less receptive to mental-health interventions that require concentration.

"I hope this device will be part of the solution for many people with problems relating to their mental well-being," said Mr. Farrall.

Focus lowers anxiety

Recent research led by Mr. Farrall shows a significant improvement in people's ability to focus on their breathing when they use his shape-

shifting ball. With their attention heightened, study participants were then able to pay closer attention to a guided audio recording from a meditation app.

Among those who used the ball, there was an average 75% reduction in anxiety and a 56% increase in protection against worry-induced thoughts. In contrast, those relying only on the [audio recordings](#) experienced a 31% reduction in anxiety (recording 44% more anxiety than their counterparts).

Additionally, those accessing the ball alongside audio guidance showed significantly higher Heart Rate Variability (indicative of better stress resilience and emotional regulation) than those using only audio, demonstrating the superior calming effect of a combined ball+audio approach.

[The study's results](#) were presented earlier in 2023 at the *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*.

Stop the drop out

Explaining how the device supports a user, Mr. Farrall said, "When an individual holds the ball, their breath becomes a physical thing between their hands. They can feel and see the flow of air as the object expands and contracts.

"This allows them to become more aware of their own internal sensations and more receptive to psychological change. It gives a personalized and engaging experience, and is accessible to everyone."

Mental health issues [costs the NHS around £118 billion annually](#), yet the demand for services significantly exceeds supply, leaving many unable to access mental health support. While [digital technologies](#) like apps have

emerged to bridge this gap, many people don't use them for long enough to enjoy the promised benefits, with one study showing that [only 3.9% of users](#) stick with an app program over a 15-day period.

Mr. Farrall's interactive ball—named the Physical Artifact for Well-being Support (PAWS)—offers a potential solution by giving people an extra incentive to actively participate in managing their mental health. In time, Mr. Farrall hopes his ball will be a tool used both by mental-health professionals and private individuals.

"I want this device to be a genuine catalyst for mental health improvement, not just in clinical settings but also for home users," he said.

Professor Jason Alexander, who supervises Mr. Farrall's project from the Department of Computer Science at Bath, said, "The beauty of PAWS is that the concept is so simple—letting someone 'feel' their breath—yet it has the potential to revolutionize the delivery and outcomes of mental health support not only in the UK but worldwide."

Haptic feedback

The ball works through [haptic feedback](#), where sensors attached to the user's body transmit data about their respiration patterns to the ball via a computer.

In the Bath study, the PAWS prototype used an electronic and pneumatic circuit to convert pulmonary activity to pneumatic activation. Future versions, however, will leverage Bluetooth technology and smart geometric structures to eliminate the need for wires, and make the device easier and more comfortable to use.

Plans for a larger study are underway to delve deeper into the potential

benefits of PAWS. This next study will incorporate insights from [mental health](#) experts and people who have spent some time using the ball.

More information: Alexz Farrall et al, Manifesting Breath: Empirical Evidence for the Integration of Shape-changing Biofeedback-based Artefacts within Digital Mental Health Interventions, *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (2023)*.
[DOI: 10.1145/3544548.3581188](https://doi.org/10.1145/3544548.3581188)

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