

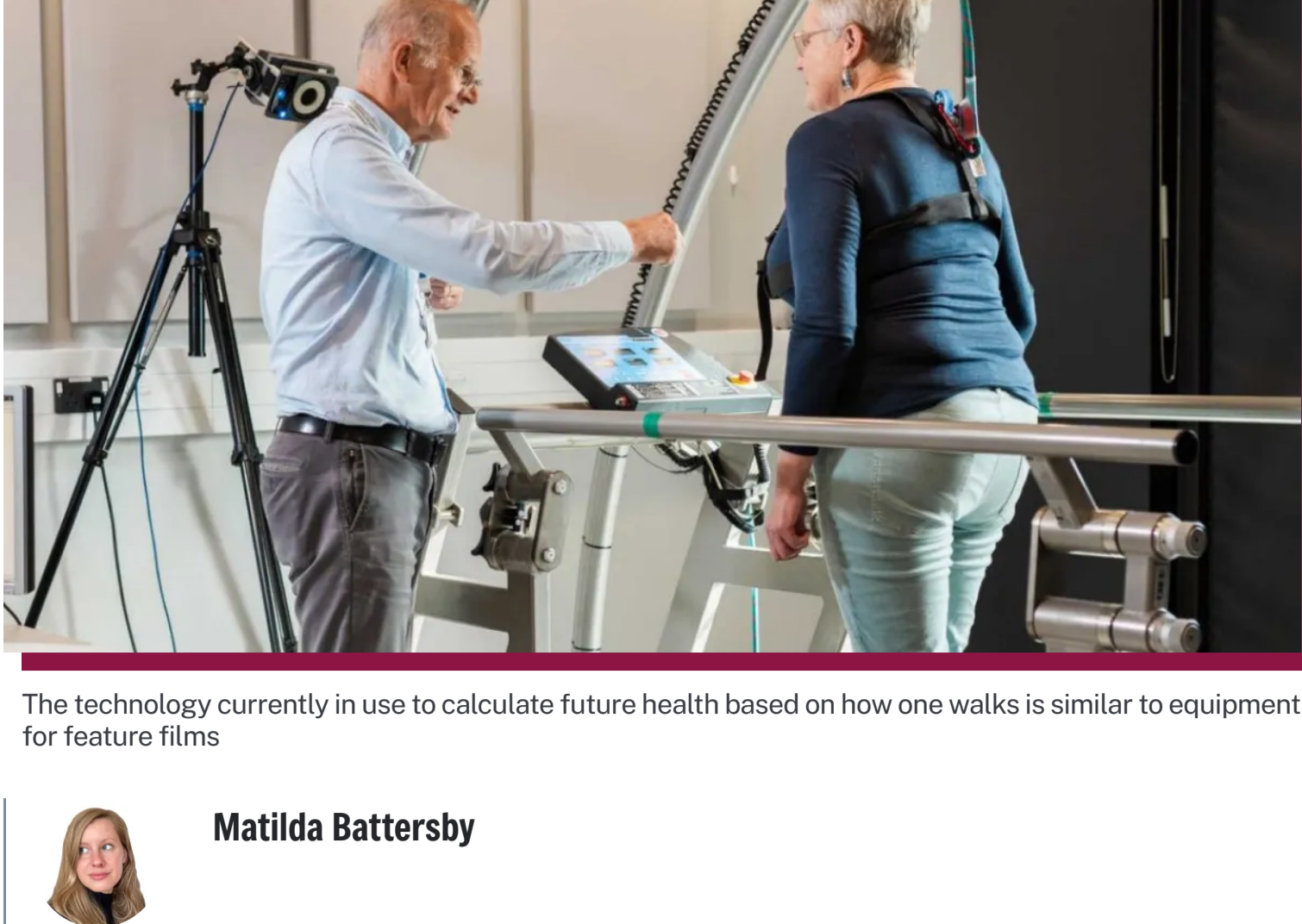
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I had my walking analysed – and discovered how fast I'm ageing

Your walking speed and style can be a pre-warning of conditions such as dementia, and now British scientists have developed a quick test that could revolutionise health

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The technology currently in use to calculate future health based on how one walks is similar to equipment for feature films

Matilda Battersby

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I'm standing in a white, entirely windowless room. I'm surrounded by cameras, and on the large screen in front of me an animated image of my skeleton appears. I follow instructions to flex each finger, wiggle my hips, and perform some other embarrassing moves, only for my animated skeleton counterpart to match my movements perfectly in real time.

It feels like I've entered *The Truman Show*, but I'm with a group of Imperial College scientists to have my walking speed and style analysed. The team are leading research showing that how you walk can reveal vital information about your future health – and even your biological age.

Our walking styles are as different and specific to us as our fingerprints, explains research engineer Dr Matthew Banger. "You walk the way you do for lots of different reasons, and people will recognise you because of how you walk," he says. "Some people are heavier-footed. Some people have a springy gait. You could probably look at a silhouette of someone moving and recognise them without their other features."



Often, he says, in conditions such as **dementia** or **Parkinson's**, "one of the first things that people report is walking or balance changes. A partner, or someone who knows you well, might notice you're walking differently up to two years before other symptoms appear."

Until recently, the research has focused on the perioperative stages of knee replacement surgery. "One of the key outcomes predicting how you are going to be after your surgery was how well you moved going into it," Banger says. "Those with stronger muscles and performed well in the functional assessments, such as walking and balance, improved more after surgery."

While diagnosing osteoarthritis or neurological disorders from your walk is the extreme end, the assessment can also show painful joints and muscle stiffness. Banger and his team are keen to track how walking reflects mental states in future, but this would require repeated assessments and a high volume of data to build an accurate picture. "To understand [mental state] we need to have a good understanding of how movement naturally changes with age and time," he says.

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How you walk can reveal vital information about your future health

The hope is that getting your walk analysed is something people might do several times in their lifetime, from early years to much later. "We've come up with this concept of biological age, to show, if there is a decline, what a healthy decline looks like. We don't want people to have this expectation that they're still going to be in their twenties forever."

I have been told that my walk is "quirky" and "distinctive" (according to my dad, I fall from foot to foot). I'm in my early forties, and I have a slight scoliosis that was only diagnosed recently – and I have several close family members who have had **arthritis**, so when I was invited to get my walk assessed at Imperial College's MSK Lab in London, I ran. I was keen to know what they could tell me about my gait, and what they could glean about my state of health as a result.

The motion-capture technology in use at the MSK Lab is similar to equipment for feature films involving complicated CGI. The key difference is, instead of having to put little bobble markers all over my body so the computer can track my movement, this lab is "markerless" – I am just required to wear some relatively tight-fitting clothing and be willing to lunge under instruction. "It uses normal footage and deep learning models to get the same information," says Banger. "You could just come in, do a two-minute assessment, and then we've got a decent profile on how you move."

I am introduced to Theo Ross, a pre-doctoral physiotherapist, who has been working for over a year to develop the best exercises to test how well people walk. Under the scrutiny of his team, and many cameras, I walk at a normal pace in a straight line from one stripe on the floor to another. I then am told to try walking as fast as I can without breaking into a run – I instantly fail, managing to semi-gallop – before repeating it, and performing a number of sitting, lunging and stepping exercises. "Squat down as low as you can. Try to keep your heels on the floor," Theo says. Then: "We're going to look at how you **balance one leg**, okay?"

The whole thing takes about 20 minutes – and a pared-down version of this experience, lasting a few minutes and with minimal lunging, is set to be available to the general public for free at the Great Exhibition Road Festival in London which runs from June 6-7. While the attraction for potential participants might be to find out if their walking age is lower or higher than their actual age, for Banger and his team, it's about finding people with conditions that progress slowly over time and so may not always be obvious to them.

"We've seen about 600 people, and we're planning to get to 10,000 so that we've got a broad range," says Banger, who is keen to assess people who haven't got a pre-existing diagnosis.

Walking and balance changes are reported in patients with dementia

The motion-capture technology used in the lab is another example of artificial intelligence opening up huge possibilities in medicine. Using it means the team can take a small snapshot and create models with wide-reaching predictive and diagnostic capabilities.

"These systems are developing quickly. It's almost at the point that what we're doing in the lab will be possible to do with your mobile phone. We feel there is going to be a real revolution of movement science, especially with people being able to measure themselves at home," says Banger.

Getting out of the lab is a great way to drum up participants, and Banger says people have queued round the corner to have their two-minute walking assessments at previous events. "We need a load of data on people in their twenties, thirties, forties, to have an idea of what all the different kinds of **walking styles** are," says Banger.

After my assessment, I received a link revealing the cadence of my steps, my (predictably slightly wonky) symmetry index, squat measurements (not wholly terrible) and how my data compared to everyone else in the study so far (decent).

Banger reassured me that all my data "all looked good and normal". Obviously, my eye went straight for the money shot: my predicted walking age? 36. At almost six years younger than my actual age, my tired feet and I will take it.

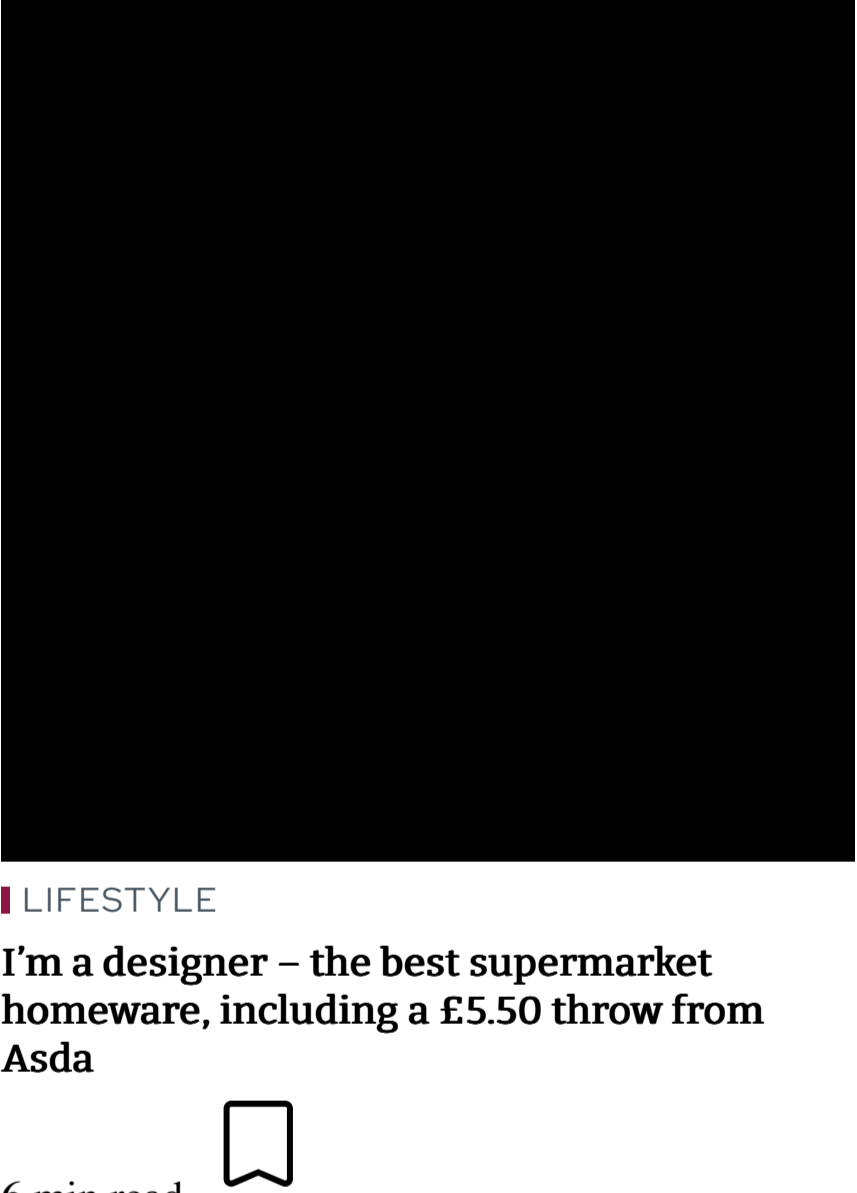
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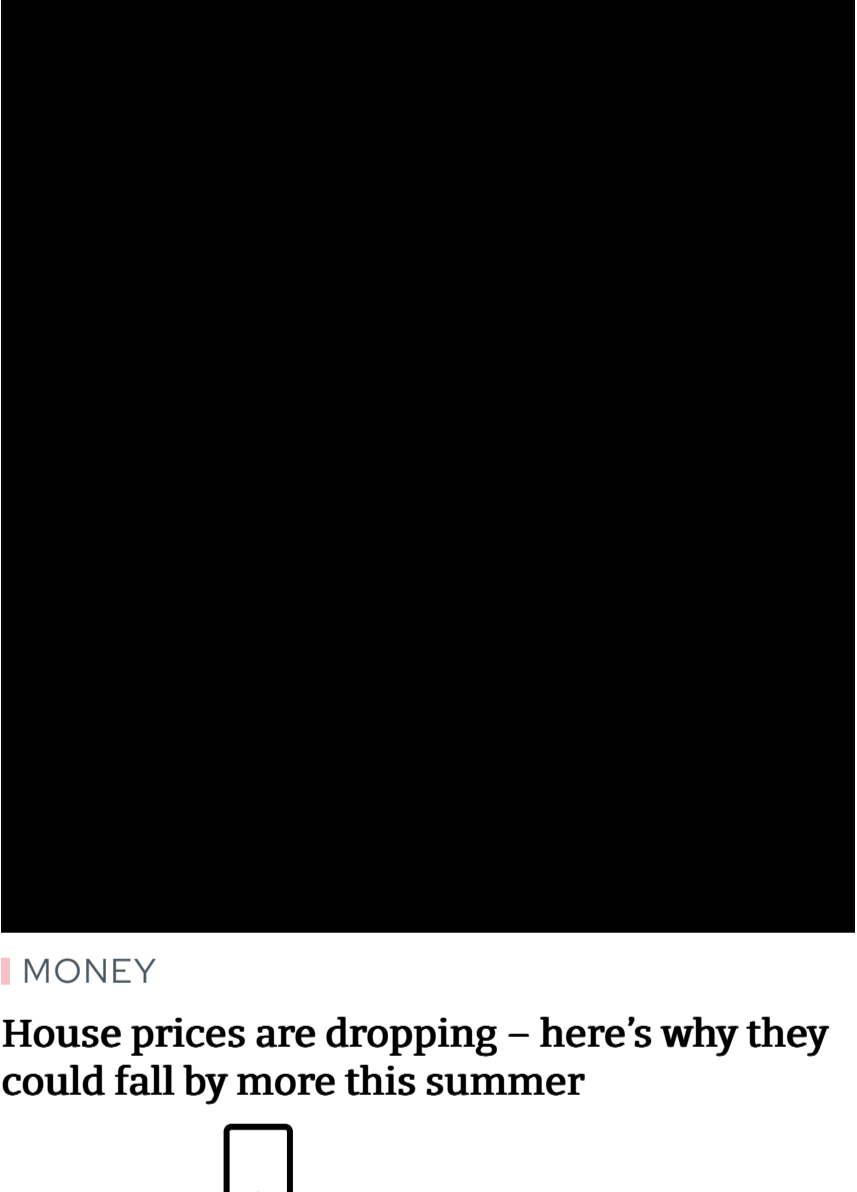
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