

Can this space-age workout boost bone strength?



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Victoria Lambert on the Marodyne LiV



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By **Victoria Lambert**

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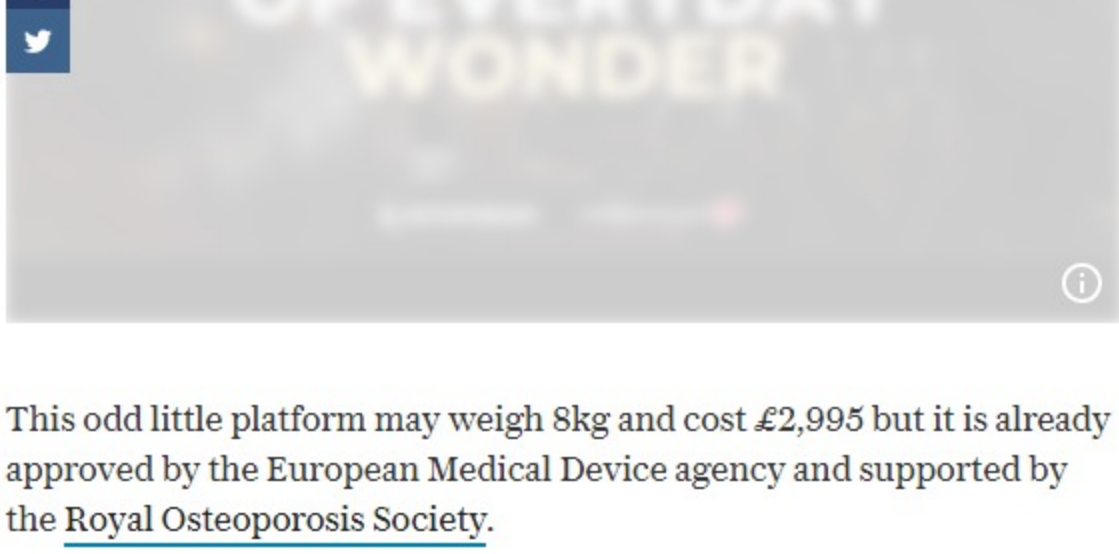
Today may be the moment I come closest ever to being a space traveller. I am about to step on to a small, flat platform which was developed thanks to NASA, during research led by Professor Clinton Rubin of Stonybrook University, New York. They were looking into why astronauts can lose up to 20 per cent of bone mass or bone mineral density a year, which is the equivalent to 10 times that in a case of pronounced, untreated osteoporosis.

The device, called a Marodyne LiV, looks much like a weighing scale. It starts to vibrate, causing a pleasant, almost silent, buzzy-ness to creep up my legs.

This is the sensation – I later learn – of exactly 0.4 units of gravity (g) being vibrated up through my body via the soles of my feet at a high frequency (30Hz). So far, so space age.

When I step off ten minutes later I will, according to the machine's manufacturers, have stimulated millions of mesenchymal stem cells (MSC) in my bone marrow to burst out and start proliferating in a healthy way. It will also be encouraging my muscles to pump up while stimulating blood circulation and lymphatic flow.

— ADVERTISEMENT —



This odd little platform may weigh 8kg and cost £2,995 but it is already approved by the European Medical Device agency and supported by the [Royal Osteoporosis Society](#).

And there is some interesting science behind it: a number of clinical studies in well-respected journals like PLoS One which have shown that LiV (which stands for low-intensity vibration) can assist in the prevention of osteoporosis in post-menopausal women and promote bone and muscle growth in younger osteoporotic women.



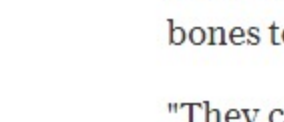
The Marodyne LiV costs £2,995

Osteoporosis – when bones become fragile and prone to breaking - is a serious problem affecting three million people, according to the Royal Osteoporosis Society. More than 300,000 fractures blamed on the condition occur every year, often from a mild bump or minor fall.

One in three say they live in unbearable pain as a result of having the condition (as a result of fractures).

And although it is more common in post-menopausal women – oestrogen has a protective role on bone health so when levels start to fall, bones become more fragile – the condition can affect anyone. From our mid-thirties, men and women alike no longer build new bone naturally.

Moreover, eating disorders, binge drinking, smoking, sitting in darkened rooms gaming for hours and hormonal disruption all make it more likely.



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Consultant Rheumatologist Dr Millicent Stone of Guys and St Thomas's Foundation Trust Hospital, London, confirms that it is natural for bones to thin as we age, without us knowing by how much.

"They call osteoporosis a silent disease," she says, "because most patients only become aware of it after sustaining a fracture when they might then be referred for a bone density scan (a DEXA scan to check out their bones).

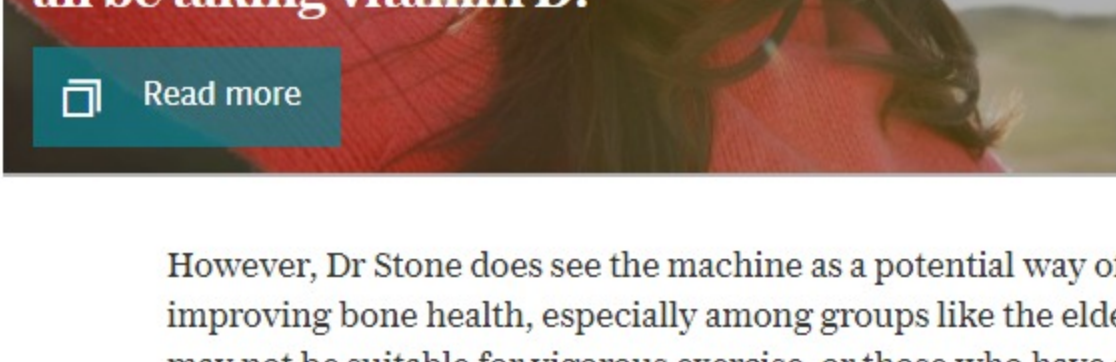
"But we don't offer DEXA scans routinely unless you have an existing risk factor as it involves a small amount of radiation."

She adds: "Risk factors are quite common especially as you age, but the main ones would be immediate family members, diseases like thyroid or coeliac, smoking, low body weight, drinking more than three units alcohol a night and having a previous fracture."

One could argue that going into the menopause is a risk factor in itself, she points out, meaning that every woman becomes at risk in the end.

Which makes anything one can do to protect bone health regardless of a formal diagnosis important.

Is Dr Stone a fan of LiV? "You have to be careful not to overcall this kind of new device," she says, "but the research is good and has been published in reputable journals. What you can't do is extrapolate data from a trial run over a couple of years to how your bone health will be over 10 years in the real world. That kind of data doesn't exist yet."



However, Dr Stone does see the machine as a potential way of improving bone health, especially among groups like the elderly who may not be suitable for vigorous exercise, or those who have a precursor of osteoporosis, osteopenia and want to be as proactive as possible in preventing deterioration in bone density.

For those of us who are not at that point, there are other ways to build strong bone, especially weight-bearing exercise. Emily Servante is a senior female trainer at the Ultimate Performance (UPfitness) gym in London's Kensington and used to taking bodies like mine through a 12-week programme to change their shape.

She aims not to just help them find a six-pack but to work on their overall health.

Servante explains that to build bone you need to use either weights like dumb bells or via resistance equipment, or the weight of your own body to put yourself under pressure. This stress seems to trigger new bone growth in response as well as building up muscles and stiffening cartilage.

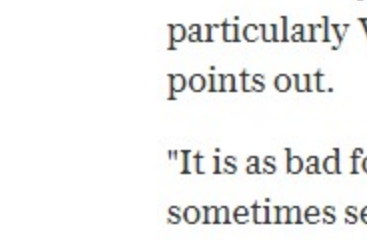
She suggests exercises in the gym like lifting weights and leg presses; at the end of a session, she has me on the sled run, dragging a heavy weight as I walk backwards quickly.

Studies bear out her suggestions: according to Korean scientists writing in the journal Endocrinology and Metabolism in December 2018, resistance exercise (RE) could be the most optimal strategy to improve the muscle and bone mass in postmenopausal women, middle-aged men, or even the older population.

Dr Stone agrees that exercise is vital: "You should be doing weight bearing exercise at least three times a week in 30 minutes sessions."

But this doesn't have to be in the gym, she points out: "Dancing and walking are also good, although watch out if you take the dog. We see a lot of fractures when people are pulled over."

If you want to incorporate more resistance training into everyday life, she suggests pulling a wheelbarrow behind you or a shopping trolley fully laden.



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Bones don't just need 'stress' to grow, they also need nutrients particularly Vitamin D and Calcium, so diet is also crucial, Dr Stone points out.

"It is as bad for your health to be too thin as too heavy," she says. "I sometimes see young women who are busy City execs running marathons at weekends, ending up with stress fractures. They may be unintentionally eating too little and then go into a negative caloric deficit which affects menstrual cycle and ultimately may lead to fractures."

Office workers can also miss out on the sunshine they need to make their own vitamin D, which is vital for bone health.

Dr Stone recommends everyone aims for 1,000mg of calcium through diet, preferably if at risk for osteoporosis and 1,000iu (international units) of Vit D3 as a catch-all.

If you aren't sure how much dairy that means for your diet, she suggests using an online calcium checker like the one on the website of the [International Osteoporosis Foundation](#) (IOF). You can log your average weekly diet to assess what your calcium intake is, increase as necessary with more dairy foods and top up with a supplement.

The key, says Dr Stone, is an integrated plan. "You need a plan that works for you whether that's through healthy eating and exercise or a device like the Marodyne. And you need to be consistent."

"Caring for your bones isn't a one-off task – it's an ongoing business. So find a way that fits into your lifestyle."

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