



e've been using music to soothe, uplift and heal for thousands of years - just ask anyone who's sung a lullaby to a fretful baby or belted out Gloria Gaynor after a breakup.

But we're entering a new era in which music is being specifically created – either by scientists or Artificial Intelligence – to produce a particular physical effect on our bodies, whether that's to relieve pain, or help us relax or sleep.

'From the first note or beat, we can now build music based on the science - perhaps activating 'energy' circuits in the brain for peak physical performance or slowing brain waves right down ready for sleep,' says neuroscientist Dr Julia Jones. 'Limitless music streaming combined with smartphone technology has given us this "music medicine" on tap, wherever we are.'

Dr Jones, author of The Music Diet (This Day in Music Books), learned about music's extraordinary power while working as a sports psychologist with GB Olympic squads, and has been researching it for 20 years. The top note? Music activates almost every region of the brain

and, as it's essentially a vibration, it triggers responses between brain cells via the ears and skin almost immediately.

Incredibly, the right music can lower your heart rate, blood pressure and levels of the stress hormone cortisol. This is thought to be because your physiological rhythms – such as breathing, heart beat and even your brainwaves – end up synchronising with the rhythm of the music.

'Essentially, you're using a beat as an entraining force for your body's rhythms,' says Lyz Cooper of the British Academy of Sound Therapy, whose new venture LifeSonics creates subscribers a 'sonic prescription' for sleep, relaxation or productivity.

Other companies are springing up, too: MediMusic has developed algorithms to generate playlists to reduce pain and anxiety; in one experiment in a Lancashire hospital, medics noted reductions of up to 22% in the heart rates of their patients.

However, we can all be our own music therapists and create our own playlists once we know what kind of music has an effect on us. 'We all have very individual responses to music – our music tastes and past experiences will influence the way we respond,' says Dr Jones. 'But the science gives us general principles, so experiment with different tracks and decide what works best for you.'

#### TO CALM AND DE-STRESS

It's no surprise that slow tempo music works best to lower heart rate, blood pressure and stress hormone levels. What you're aiming to do is trigger the part of the nervous system that's associated with rest and repair (called the parasympathetic nervous system or PNS), as opposed to the one that's activated when we're under stress or facing a threat (the sympathetic nervous system or SNS).

'Tempo is more important than genre,'

Music streaming

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says Dr Jones. 'For some, a chilled electronica track might work, for others it might be classical music.' Self-selected music tends to work best. In one small study, students either sat in silence or listened to classical, heavy metal or their own choice of music after a stressful test.

Those listening to self-selected or classical music experienced lower anxiety and SNS arousal than the others.

The right music can work within three minutes to bring anxiety down, and a study in Pennsylvania found listening to music could even match the relaxing effect of a sedative injection given to patients just before a hospital operation. Researchers used a 2011 ambient track with guitar and piano mixed with natural sounds called *Weightless* by Marconi Union. The eight-minute piece starts at 60 beats per minute (bpm) and slows to 50, which brings the heart rate down.

Slowing your breathing and exhaling for longer than you inhale is key to activating the vagus nerve, a key part of the PNS. Try Dr Jones's *MusicHacks* tracks on Spotify or Apple Music (choose your own genre, including pop, lo-fi and electronica). All tracks have an unusual time signature of 4:6. The idea is to breathe in during the four-beat bar

### FINE-TUNE YOUR PHYSICAL HEALTH

- PAIN RELIEF Listening to 'bittersweet and moving' music reduced pain intensity (from a hot cup of tea placed on the inner arm) by as much as an ibuprofen, according to a study last year.
- evidence that listening to music you like can boost the immune system,' says neuroscientist and cognitive psychologist Professor Levitin. Studies have shown levels of the immunity antibody immunoglobulin A rise when listening to music.
- BLOOD PRESSURE If you have high blood pressure, listening to music you find relaxing can reduce systolic pressure (the first figure in your reading, e.g. 150/90) by up to six points.

and out for the six-beat bar, eventually achieving a breathing rate of 6bpm, which scientists have proved is the perfect rate to achieve relaxation and stimulate the vagus nerve.

#### TO HELP YOU SLEEP

'Music can help slow your brainwaves down from gamma levels (when you're alert) to the slowest delta waves (during restorative deep sleep), something many struggle to achieve as they get older,' says Dr Jones.

Scientists always thought the best music for sleep was slow (around 60bpm), with simple rather than complex rhythms, minimal percussion and no lyrics to distract the brain. However, an Australian study discovered that the music people found most effective didn't need to be really slow – 108bpm was the average – and it could have lyrics. They did find, however, that most successful sleep music used a lower pitch, had smooth articulation rather than staccato and often involved the piano.

Those results were echoed in a huge study of more than 225,000 tracks on 985 'sleep' playlists on Spotify last year. The most popular tracks included *Jealous* by Labrinth (85bpm) and *Lovely* 





by Billie Eilish and Khalid (115bpm). 'Both are characterised by medium-low tempo, yet with an emphasis on half-time and a spare instrumentation with focus on long melodic lines,' says co-author Rebecca Jane Scarratt at Aarhus University in Denmark. Also among the top 20 sleep tracks were Coldplay's The Scientist, Supermarket Flowers by Ed Sheeran and Someone You Loved by Lewis Capaldi.

### TO POWER UP THE BRAIN

You'll get some scientists saying that any music is bad for concentration, but the research is divided: some studies show it can help with memory tasks, especially when it's classical and calming. One found slow classical (Tomaso Albinoni's Adagio In G Minor) seemed to work better than faster classical (Mozart's Sonata For Two Pianos In D).

helps them sleep. According to Craig Richard, a professor of When it biopharmaceutical sciences, the host's comes to maths, critical voice should be calm and the thinking and content should be soothing. reasoning, most studies say music is a bad idea, especially when there are lyrics. 'It's very individual,' says Dr Julia Jones. 'I know people who can't listen to anything when they're concentrating and others who can only work to music.'

Where music really works, says Dr Jones, is in a distracting environment such as an open-plan office. 'I use soundscapes here - with sounds of nature, white and pink noise and running water. It's minimalistic and repetitive - a kind of acoustic blocker, because your brain is receiving the sounds of the environment if you're not giving it something else.'

## TO LIFT YOUR MOOD

You don't have to listen to happy music to cheer you up if you're feeling down in fact, studies have found listening to sad music can really help - possibly because it reflects your feelings, which validates them and consoles you.

'However, in general, uplifting music tends to be energetic - but not manic because that would push into stressful,' says Dr Jones.

The music raises levels of feelgood chemicals such as dopamine and serotonin Sometimes

that feeling of intense musical pleasure will even give you 'the chills'. This kind of music is very personal, say scientists, although some pointers have emerged: music that builds

up tension then releases it explosively can trigger the release of positive neurochemicals, as can repeating musical motifs because the brain is eagerly anticipating the next repeat, which lifts energy.

For most people, the most effective mood-lifting music are songs from your youth, says Dr Jones. 'Those memories are deeply embedded in the brain, and when you hear the music associated with them, it has a highly energising and uplifting effect.'

# THE NEUROSCIENTIST'S PLAYLISTS

FOR RELAXATION - choose slow tempos and rhythmic styles that make you gently sway or bring stillness and calm. A few worth trying are:

- Avalon by Roxy Music
- All Night by Beyoncé
- Watermark by Enya
- · By Your Side by Sade
- The new MusicHacks collection on Spotify and Apple Music
- FOR HAPPINESS singing along to your favourites gives a quick surge of feelgood neurochemicals.
- A few popular examples could be:
- Africa by Toto
- · Can't Stop The Feeling! by Justin Timberlake
- · Everybody Dance by Chic
- A Little Respect by Erasure
- · Together In Electric Dreams by Human League

FOR ENERGY - up-tempo songs from your youth bring back memories of empowerment and help you increase movement and heart rate. Typical choices could include:

- · Mr Brightside by The Killers
- · Take On Me by A-ha
- · Call Me by Blondie
- I'm Still Standing by Elton John
- · Hung Up by Madonna

'Remember that the songs you love have the greatest effect,' says Dr Julia Jones.  $\hfill\Box$