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The science behind the world's greatest race

The final stretch: Hayley Carruthers crawls the last few yards over the line © Getty

Should you run a marathon? Yesterday in London about 40,000 runners did. The incredible Eliud Kipchoge set a new record. Others used sheer willpower to stagger, limp or crawl to the finish.

There were pop stars, a man dressed as a rhinoceros, and an 85-year-old named Kenneth Jones, who has run all 39 London Marathons since 1981.

But Eliud Kipchoge was easily the fastest of all the 40,000 runners who took part in yesterday's epic race. He finished in 2:02:37 — a record for the London Marathon, and the second-fastest ever recorded time. (Kipchoge also holds the world record, 2:01:39, achieved last September in Berlin.)

"I am happy to make history by winning this race four times," he told reporters. "And to see this race raise £1 billion for charity."

British runner Mo Farah came in fifth. At 25-years-old, Brigid Kosgei became the youngest-ever winner of the women's race, with a time of 2:18.20.

The thousands of runners must now spend a few days allowing their bodies to recover. Completing a marathon is hard work, and it does strange things to the body.

For starters, the average marathoner finishes the race about 1.25cm shorter than they were when they started. This is because the discs in their spine compress as they run (although, luckily, they stretch out again after 24 hours or so).

Runners can lose up to six litres of sweat. Meanwhile, the body's core temperature reaches a fever pitch of around 39C, only to plummet as their sweat cools once the race is over. The sudden drop in temperature puts them at risk of hypothermia, which is why they are often wrapped in foil blankets.

Inside, your body's support systems are working in overdrive. The heart pumps four times the usual amount of blood, prioritising the brain and muscles so that other organs, such as the kidneys, stop working.

After around 20 miles, the body has burned up its entire supply of carbohydrates, and must rely on fat and protein alone. This is when they hit “the wall”: the feeling that they cannot continue. It is sheer determination that forces them on.

Yet despite the toll it takes on the body, marathons are extremely popular. In fact, the number of ultra marathons (anything longer than 26.2 miles) increased by 1000% in the decade before 2018.

Run for it?

Why put yourself through all that? Marathons seem to be specifically designed to put your body through hell. In some cases, they can even be fatal: 12 people have died during the London Marathon’s history, usually due to unknown heart conditions. Exercise may be good for you, but marathons are definitely not.

But for the converted, that is not the point. Marathons are a test of endurance, about pushing the body to its limits and still achieving something amazing. Besides, humans were born to run; they may not be the fastest animal on the planet, but they can run farthest and longest. Marathons are a testament to that ancient skill.

YOU DECIDE

1. Would you like to run a marathon one day?
2. What motivates people to run marathons if they know they will be painful?

ACTIVITIES

1. Create a poster which gives tips for staying healthy while running a marathon.
2. Draw a diagram which explains what happens to the body during a marathon, using information from this article and the links under “Become an Expert”.

SOME PEOPLE SAY...

“I run in a void. Or maybe I should put it the other way: I run in order to acquire a void.”
Haruki Murakami

WHAT DO YOU THINK?

Q & A

What do we know?

Marathons are 26.2 miles as a nod to Ancient Greece. The distance is based on a legendary run by the soldier Pheidippides in 490 BC. He ran from the town of Marathon to Athens in order to announce a victory in battle, a distance of about 25 miles. (Announcement made, he promptly died.) Modern marathons began at the first modern Olympics in Athens in 1896, and the distance was made official in 1908.

What do we not know?

Whether we will ever see a two-hour marathon. Runners have been trying for decades — but although Kipchoge has come tantalisingly close (see the video under “Become an Expert”) the barrier remains stubbornly unbroken.

WORD WATCH

Rhinoceros

Dave Wardle was raising money for the charity Save the Rhino.

£1 billion

This is the total amount raised for charity since the race began in 1981, according to its organisers.

Six litres

According to the Boston Athletic Association, the average person sweats 0.8 to 1.4 litres per hour of exercise. This equates to between 3.4 to six litres during a marathon.

Hypothermia

When your body temperature drops below 35C. According to the NHS, early symptoms include shivering, cold skin, slurred speech and confusion. Normal body temperature is around 37C.

Four times

According to Professor Niall Moyna of Dublin City University, writing for RTÉ.

1000%

According to the Run Ultra website, which records ultra marathons around the world. Find out more about them under “Become an Expert”.