

PANDORA'S BOX

Pandora searches world literature and other sources for evidence, news and matters of interest to bring the reader (and doesn't shy away from controversy). She welcomes comments and suggestions (via ip@rcpsych.ac.uk).

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Getting old and forgetful

As we grow older, our bodies deteriorate and so does our brain, with our memory gradually failing us. In a series of studies, researchers in Umeå, Sweden, claim to have identified a vascular cause for this brain deterioration. As our bodies age, our large arteries stiffen. The aortic wall loses its flexibility and becomes less able to accommodate the increased pressure of the volume of blood ejected with each heart contraction. As a result, the increased pressure is transmitted downstream to the small blood vessels in the brain causing, over time, increasing damage to the capillary wall and surrounding cells. This impairs the ability to increase blood supply to the brain areas as needed for more demanding cognitive processes.

Episodic memory, the ability to remember events from the past, is most affected because, according to the researchers, the hippocampus is particularly vulnerable to deterioration; this, they claim, is owing to its location, being in the vicinity of large vessels and hence exposed to capillary cell damage at an earlier stage.

Wählin A. and Nyberg L. (2019) At the heart of cognitive functioning in aging. *Trends in Cognitive Sciences*, 23(9), 717.

Never too late for body building

As we grow older, our muscles thin down. According to the International Osteoporosis Foundation, there is a progressive loss of muscle tissue from the age of 40, which becomes more significant when reaching 60 and 70, impairing muscle strength, gait and balance. Muscle fibres are reduced both in number and size. Nutrition with adequate protein content is essential, but can this sarcopenia be remedied through exercise in older age? A recent study claims it can.

The authors studied two groups of people, both in their 70s and 80s, with one group consisting of lifelong exercisers still competing in their sport and the other of healthy individuals who never took part in exercise programmes. All participants were given an isotope tracer to assess how proteins developed in their muscles, before taking part in a single bout of weight training on an exercise machine. The researchers took muscle biopsies from all participants before and after exercise to check for muscle response to exercise.

Surprisingly, both the lifelong athletes and the couch potatoes showed the same capacity for muscle build-up post exercise. No excuse anymore; get those muscles working!

McKendry J., Shad B. J., Smeuninx B., et al. (2019) Comparable rates of integrated myofibrillar protein synthesis between endurance-trained master athletes and untrained older individuals. *Frontiers in Physiology*, doi: 10.3389/fphys.2019.01084.

Tickle your ear to better health?

As we grow older, the balance of our autonomic system changes, with the sympathetic

activity dominating over the parasympathetic that fails to keep up. This autonomic imbalance unfortunately impairs our bodily functions, rendering us more vulnerable to disease.

Stimulation of the vagal nerve, the major nerve of the parasympathetic system, could potentially help regain some balance. This approach has already been used with some success in the treatment of various conditions, including epilepsy and depression. However, the procedure is invasive, requiring the implantation of electrodes in the neck.

In a recent study, researchers at Leeds University used instead a small branch of the vagal nerve, located in the outer ear, as a site for transcutaneous stimulation. They used this approach, which causes a sensation of tickling, to investigate the effects of a single session of vagal nerve stimulation (tVNS) in two earlier studies and tVNS administered daily for 2 weeks in a third study, which was carried out in volunteers aged 55 and above. They assessed heart rate variability and baroreflex sensitivity, and additional ratings of quality of life (QoL), mood and sleep were done in the third study.

The results showed an improvement in autonomic balance, which was noted to be more marked in participants with greater baseline sympathetic prevalence. Some aspects of QoL, mood and sleep were also improved. Future work could elucidate whether this simple method is of any value in improving physical or mental well-being in the older population.

Bretherton B., Atkinson L., Murray A., et al. (2019) Effects of transcutaneous vagus nerve stimulation in individuals aged 55 years or above: potential benefits of daily stimulation. *Aging*, doi: 10.18632/aging.102074.

Can we train our brain?

It is fascinating to observe the skill of people producing remarkable paintings using their feet. Unlike other primates, which are quite dextrous with their feet as well as their hands, humans, although highly dextrous with their hands, particularly the fingers, are much less adept with their feet and toes.

Our brains reflect this, in that each individual finger is mapped in the hand area, whereas our toes are indistinct. The capacity of the human brain for neuroplasticity is enormous, but how much can brain mapping adapt?

A study at University College London showed striking results. The participants were two professional foot painters who used their toes to hold paintbrushes for their work. They also used their toes for dressing, eating, typing and other daily activities. It was noted that they did not regularly wear footwear, thus having more complex touch experiences in their toes.

The comparison group consisted of 21 people born with two functioning hands. All study participants took part in a series of tasks testing their sensory perception and motor control of their

toes, and underwent ultra-high-resolution functional magnetic resonance imaging (fMRI) scans of the somatosensory cortex of the brain. The toes of each participant were tapped while in the scanner to identify activity in the foot area of the body map.

In the foot painters' fMRI scans, the foot area of the brain mapped individual toes of their dextrous foot, and these were represented as the fingers would normally be in the hand area of the brain. The controls did not show such maps. Interestingly, the foot painters' toes were also represented in the area of the brain that would normally have served the hands.

The authors conclude that the body maps in our brains are not fixed and that the brain's innate capacity for plasticity is much greater than appreciated so far.

Dempsey-Jones H., Wesselink D. B., Friedman J. and Makin T. R. (2019) Organized toe maps in extreme foot users. *Cell Reports*, 28(11): 2748.

Health workers migration – who benefits the most?

A recent report by THET examines the problems presented by the migration of health workers from low- and middle-income countries (LMICs) to the UK and other high-income countries. The report contains a well-balanced discussion of the major contribution of the UK to LMICs through health partnerships and non-governmental organisations, and highlights the economic pressures in such countries that impair their ability to employ their locally trained health workers, as well as the benefits for those

individuals migrating to the UK and enjoying better economic status and work opportunities.

Since its inception in 1948, the UK National Health Service (NHS) has relied significantly on migrant health workers, mostly from LMICs, and 71 years later it still does so to an even greater extent. The question needs to be asked: why after all these years since the creation of the NHS has the UK not been able to train enough health professionals to cover its needs? And why do high-income countries such as the US, Australia and others have such a major need for migrant health staff?

It is not within the scope of this article to focus on this issue, but *Pandora* questions the ethics of high-income countries 'poaching' workers from poorer countries that are in desperate need of their skills. The benefits for the individuals concerned are not in doubt, but what about their countries of origin, which trained them at a great expense only to lose their much-needed skills to countries that can offer better pay and conditions?

This situation concerns not only LMICs but also other European countries whose economic status is not as good as that of the UK, France, Germany or other Northern European countries. The protracted Brexit saga has highlighted the plight of the NHS and its enormous reliance on health workers from Southern and Eastern Europe, and the fear of it collapsing in their absence. What about those countries that for some years now have been suffering a continuous loss of their skilled health professionals and in some cases are struggling to provide adequate health services to their own populations?

Chisholm G. (2019) *From Competition to Collaboration: Ethical Leadership in an Era of Health Worker Mobility*. THET.