

Opinion **Mental health**

## Digital neuroscience can help alleviate the mental health crisis

The pandemic has inflicted a heavy toll, but new online tools offer cheap and accessible therapy

**BRUCE WEXLER**



A mural in east London during lockdown alludes to the impact the pandemic has had on people's mental health © Tolga Akmen/AFP/Getty

**Bruce Wexler** APRIL 23 2021

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*The writer is professor emeritus of psychiatry at Yale School of Medicine and co-founder of C8 Sciences*

The ways in which the Covid-19 pandemic has damaged mental health are becoming glaringly apparent. Hospitals are overburdened by mentally ill patients, therapists are unable to accept more clients, and there are [accounts of a surge](#) in student suicides across the US.

The fact [the pandemic has markedly increased](#) the number of people experiencing anxiety and depression is not a surprise. The structure and function of our brains are shaped by input from other humans and human-made environments, and we need to visit familiar faces and places to maintain healthy brain function, especially in times of stress. Lockdowns have prevented that, making it critical we apply the same enthusiasm to protecting our mental health as we have with our physical health against the virus.

Without intervention the already soaring economic and social costs of depression will multiply. Prior to the pandemic, the annual economic burden of depression in the US was [\\$210.5bn](#). [Mental illness in the UK](#) is the single largest cause of disability, contributing 22.8 per cent of the total, compared with 16.2 per cent for cardiovascular disease. Depression and stress greatly increase death rates from [cancer](#), [cardiovascular disease](#) and [diabetes](#).

We have known for decades that the early detection and treatment of depression saves lives and reduces costs. We make early interventions, such as promoting good diet and exercise, to reduce the impact of cardiovascular disease. Why have we only barely begun to do so with mental illnesses? In the US, 60 per cent of [adolescents and young adults](#) with major depressive disorders reported receiving no treatment in the year before they were surveyed. This was also true for between one and two-thirds of [adults](#) with serious mental disorders in Canada, the US, Chile, Germany and the Netherlands.

Neuroscience provides new tools with which we can respond at scale. With online learning at an all-time high, digital neurotherapies, or DNTs, suit the new virtual normal. They use the same neural pathways and processes that create the brain's functional systems in order to repair them.

An example: neurosystems in the frontal, parietal and temporal lobes regulate the amygdala and hypothalamic-pituitary axis, which generate negative emotions and stress hormones. In depression, these executive function systems are weakened and the regions they regulate become [more active](#), leading to heightened negativity and stress.

DNTs for depression consist of attention, self-control, cognitive flexibility and memory tasks that activate the compromised systems. Tasks change depending on the person, like an automated personal brain trainer. The difficulty level is continuously adjusted to maintain the optimal level for neuroplastic change — challenging the brain to adapt. In one study, depressed patients who failed to respond to antidepressants [recovered](#) after four weeks of DNT.

Neuroscience has repeatedly shown that stress and limited opportunities for stimulation hinder brain development in children [affected by poverty](#). The pandemic has compounded these problems. DNTs, such as the ones developed by my programme, can help promote the development of executive function systems in [children](#), demonstrating dramatic reductions in achievement gaps.

Online cognitive behaviour therapy for adults takes a slightly different approach, but one that can be [similarly effective](#). Through instruction and practice of specific cognitive strategies, CBT enables weakened frontal control systems to regain control. Online versions use animations and videos to teach depressed or anxious people to identify cognitive distortions, shift focus from the negative to the positive, stop overgeneralising the implications of negative life events, and avoid catastrophic thinking. Checklists, homework and pairing with an online partner come as part of the programme.

The barriers to rolling out these tools at the pace and scale required are relatively low. One year of digital neurotherapy generally costs less than an hour of psychotherapy. The vetting of programmes, by governments or a national health service, will be essential. For children, schools can provide the infrastructure for monitored implementation.

The suffering of depression, tragedy of suicides, destabilising burden of youth unqualified for employment and impact on workforce productivity demand urgent action. We have seen the result of our failure to effectively contain the spread of Covid-19. Let us take action now to stay ahead of the mental health consequences of the pandemic and demonstrate the power of innovative science and technology.