

Stimulating the brain with electricity may reduce bulimia symptoms

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King's researcher, Maria Kekic (left), delivering transcranial direct current

stimulation (tDCS). Credit: King's College London

Key symptoms of bulimia nervosa, including the urge to binge eat and restrict food intake, are reduced by delivering electricity to parts of the brain using non-invasive brain stimulation, according to new research by King's College London.

Bulimia is an eating disorder characterised by a vicious cycle of repeated bouts of distressing binge eating and inappropriate attempts to compensate for overeating through vomiting, extreme dieting, or the misuse of different medicines. These symptoms are typically driven by an intense preoccupation with body weight, shape or appearance. Over time these features become compulsive and resemble those of an addiction.

Bulimia typically emerges in adolescence and is much more likely to develop in women. It is thought that 1-2 per cent of women have bulimia at some stage in their life. The disorder is associated with multiple medical complications and up to 4 per cent of people with bulimia die prematurely from the disorder.

Whilst existing treatments such as [cognitive behavioural therapy](#) (CBT) are effective for many people with bulimia, a substantial proportion do not get better with talking therapies. There is a pressing need for new techniques and researchers are increasingly looking towards neuroscience-based technologies that could target the underlying neural basis of eating disorders, such as problems with reward processing or self-control.

Previous studies published by the Eating Disorders Research Group at King's found that repetitive [transcranial magnetic stimulation](#) (rTMS),

already an approved treatment for depression in the US, was effective in reducing food craving in people with bulimia.

This new study, published today in *PLOS ONE*, examined the use of transcranial direct current stimulation (tDCS), a less expensive and more portable form of brain stimulation. tDCS uses electrodes placed on the head to stimulate specific parts of the brain, which could improve cognitive function in areas related to reward processing and self-control. The treatment is painless and the most common side effect is a slight itching or tingling on the scalp.

In the study, 39 people received real tDCS and placebo tDCS, with a period of at least 48 hours between both sessions. The researchers used questionnaires before and after each session to measure their urge to binge eat and a range of other bulimia symptoms, including concerns about weight and shape, restriction of [food intake](#), levels of self-control and self-esteem.

They found that these bulimia symptoms were significantly reduced by the tDCS treatment but not the placebo session. For example, baseline scores on the urge to binge eat scale decreased by 31 per cent following tDCS.

The researchers also used a decision-making task where participants had to choose between a smaller amount of money available immediately and a larger amount available in three months.

They found that people showed a greater tendency to delay gratification following the tDCS session compared to the placebo session. This means they showed more prudent decision-making by waiting for larger, later rewards, rather than choosing the smaller, sooner option.

Maria Kekic, first author of the study, from the Institute of Psychiatry,

Psychology & Neuroscience (IoPPN) at King's College London, said: 'Our study suggests that a non-invasive brain stimulation technique suppresses the urge to binge eat and reduces the severity of other common symptoms in people with [bulimia nervosa](#), at least temporarily. We think it does this by improving cognitive control over compulsive features of the disorder.

'Although these are modest, early findings, there is a clear improvement in symptoms and decision-making abilities following just one session of tDCS. With a larger sample and multiple sessions of treatment over a longer period of time, it is likely that the effects would be even stronger. This is something we're now looking to explore in future studies.'

Professor Ulrike Schmidt, senior author of the study, from the IoPPN at King's College London, said: 'The advantage of tDCS is that it's much less expensive and more portable than other [brain stimulation](#) techniques, which raises the prospect of one day offering treatment that could be self-delivered at home by patients with [bulimia](#). This could either be as an addition to talking therapies such as CBT to improve outcomes, or as a stand-alone alternative approach.'

More information: Kekic M, McClelland J, Bartholdy S, Boysen E, Musiat P, Dalton B, et al. (2017) Single-Session Transcranial Direct Current Stimulation Temporarily Improves Symptoms, Mood, and Self-Regulatory Control in Bulimia Nervosa: A Randomised Controlled Trial. *PLoS ONE* 12(1): e0167606. [dx.plos.org/10.1371/journal.pone.0167606](https://doi.org/10.1371/journal.pone.0167606)

Provided by King's College London

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