Medical Xpress

Brain activity in sex addiction mirrors that of drug addiction

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Pornography triggers brain activity in people with compulsive sexual behaviour – known commonly as sex addiction – similar to that triggered by drugs in the brains of drug addicts, according to a University of Cambridge study published in the journal *PLOS ONE*. However, the researchers caution that this does not necessarily mean that pornography itself is addictive.

Although precise estimates are unknown, previous studies have suggested that as many as one in 25 adults is affected by compulsive sexual behaviour, an obsession with sexual thoughts, feelings or behaviour which they are unable to control. This can have an impact on a person's personal life and work, leading to significant distress and feelings of shame. Excessive use of pornography is one of the main features identified in many people with compulsive sexual behaviour. However, there is currently no formally accepted definition of diagnosing the condition.

In a study funded by the Wellcome Trust, researchers from the Department of Psychiatry at the University of Cambridge looked at brain activity in nineteen male patients affected by compulsive sexual behaviour and compared them to the same number of healthy volunteers. The patients started watching pornography at earlier ages and in higher proportions relative to the healthy volunteers.

"The patients in our trial were all people who had substantial difficulties controlling their sexual behaviour and this was having significant

consequences for them, affecting their lives and relationships," explains Dr Valerie Voon, a Wellcome Trust Intermediate Clinical Fellow at the University of Cambridge. "In many ways, they show similarities in their behaviour to patients with drug addictions. We wanted to see if these similarities were reflected in brain activity, too."

The study participants were shown a series of short videos featuring either sexually explicit content or sports whilst their brain activity was monitored using functional magnetic resonance imaging (fMRI), which uses a blood oxygen level dependent (BOLD) signal to measure brain activity.

The researchers found that three regions in particular were more active in the brains of the people with compulsive sexual behaviour compared with the healthy volunteers. Significantly, these regions – the ventral striatum, dorsal anterior cingulate and amygdala – were regions that are also particularly activated in drug addicts when shown drug stimuli. The ventral striatum is involved in processing reward and motivation, whilst the dorsal anterior cingulate is implicated in anticipating rewards and drug craving. The amygdala is involved in processing the significance of events and emotions.

The researchers also asked the participants to rate the level of sexual desire that they felt whilst watching the videos, and how much they liked the videos. Drug addicts are thought to be driven to seek their drug because they want – rather than enjoy – it. This abnormal process is known as incentive motivation, a compelling theory in addiction disorders.

As anticipated, patients with compulsive sexual behaviour showed higher levels of desire towards the sexually explicit videos, but did not necessarily rate them higher on liking scores. In the patients, desire was also correlated with higher interactions between regions within the

network identified – with greater cross-talk between the dorsal cingulate, ventral striatum and amygdala – for explicit compared to sports videos.

Dr Voon and colleagues also found a correlation between brain activity and age – the younger the patient, the greater the level of activity in the ventral striatum in response to pornography. Importantly, this association was strongest in individuals with compulsive sexual behaviour. The frontal control regions of the brain – essentially, the 'brakes' on our compulsivity – continue to develop into the mid-twenties and this imbalance may account for greater impulsivity and risk taking behaviours in younger people. The age-related findings in individuals with compulsive sexual behaviours suggest that the ventral striatum may be important in developmental aspects of compulsive sexual behaviours in a similar fashion as it is in drug addictions, although direct testing of this possibility is needed.

"There are clear differences in brain activity between patients who have compulsive sexual behaviour and healthy volunteers. These differences mirror those of drug addicts," adds Dr Voon. "Whilst these findings are interesting, it's important to note, however, that they could not be used to diagnose the condition. Nor does our research necessarily provide evidence that these individuals are addicted to porn – or that porn is inherently addictive. Much more research is required to understand this relationship between compulsive sexual behaviour and drug addiction."

Dr John Williams, Head of Neuroscience and Mental Health at the Wellcome Trust, says: "Compulsive behaviours, including watching porn to excess, over-eating and gambling, are increasingly common. This study takes us a step further to finding out why we carry on repeating behaviours that we know are potentially damaging to us. Whether we are tackling sex addiction, substance abuse or eating disorders, knowing how best, and when, to intervene in order to break the cycle is an important goal of this research."

More information: Voon, V et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. *PLOS ONE*; 11 July 2014

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