

## Gambling

**The almost-winning addiction**

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**Near misses could heighten gambling addiction****Almost got the jackpot there**

IT IS not the thrill of winning, but the thrill of almost winning that sets a problem gambler apart from those who just fancy a flutter. A strong reaction in the brain in response to “near misses” is correlated with a greater tendency to compulsive gambling, according to new research.

Gambling touches almost everyone, from friends playing online poker to grannies buying lotto tickets. For many it is just good fun, but for some it becomes a debilitating addiction which wrecks lives: they need bigger wins to satisfy their craving, and when forced to stop they suffer withdrawal symptoms.

Henry Chase of the University of Nottingham and Luke Clark of the University of Cambridge, are interested in the cognitive complexities of gamblers. For instance, gamblers often believe that games like roulette, or picking lottery numbers, involve some degree of skill, even though they do not. In games where skill does matter, such as football, a near miss like kicking a ball into the goalpost can rightly be associated with almost scoring a goal. So assigning value to an almost-goal makes some sense. But in games of chance, near misses are meaningless. They say nothing about the future likelihood of winning.

Yet that is not the way many people think about it. Dr Chase and Dr Clark have found that in normal healthy volunteers, near misses that won participants not a penny still activated parts of the brain

associated with monetary wins. In a new study in the *Journal of Neuroscience* they set out to discover just how that brain activation was related to gambling "severity".

They invited 20 volunteers, two of whom were women, to play a kind of slot machine while a functional magnetic-resonance imaging scanner examined their brain activity. These machines show certain parts of the brain "lighting up" with increased blood flow as they become active.

The volunteers all enjoyed some gambling, ranging from off-course betting on race horses and football matches to playing slot machines, scratch cards and lotteries. All but one volunteer—who had been abstinent for a year—gambled at least once a week. Bets ranged from five people who routinely spent £10-100 (\$15-150) a day on gambling and two who were willing to drop over £10,000. Perhaps not surprisingly, 13 of the volunteers would have been considered to have an excessive gambling habit on conventional tests.

The game was simple: when an icon on the left-hand reel lined up with the same icon on a right-hand one, the volunteer won a cash prize of 50 pence (75 cents). Sometimes the volunteers could pick the left-hand icon. At other times it was selected for them. A near miss came with the agonising deceleration of the right-hand reel so that something like a cowboy boot, an anchor or a banana eventually stopped within a space or two of lining up with a matching icon on the left. In fact, the results were rigged and all participants got 30 wins, 60 near misses and 90 clear misses.

The researchers found that those who scored highest in gambling severity also showed the most activity in the midbrain area in response to near misses. (They did not differ in their response to real wins, however.) This area of the brain is of interest to researchers because it is where dopamine, a neurotransmitter, is produced. Dopamine has been implicated in other addiction studies. It could be the near misses that enhance dopamine transmission in gamblers who suffer the most severe problems, the study suggests. Which means it might be possible to find treatments that reduce dopamine transmission in the brain to take some of the compulsion out of gambling.

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