

Alcohol can damage and change the size, structure and function of adolescent brains



The expert

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See the damage in their grades

The impact of alcohol on teenagers' brains is bigger than you might imagine, explains Dr Aric Sigman

WHEN I'M ASKED to give PSHE talks on alcohol, most teachers, pupils and parents seem surprised that much of what I have to say has nothing to do with anti-social binge-drinking, liver disease, drink-driving or rehab – because the effects of drinking are much closer to home, reaching deep into the classroom in ways we didn't previously understand.

The US Department of Health's position on the neurological effects of alcohol is clear: "Underage [under the age of 21] drinking can cause alterations in the structure and function of the developing brain, which continues to mature into the mid to late 20s, and may have consequences reaching far beyond adolescence."

Those consequences are becoming even clearer through evidence from molecular neurobiology to teratology (the study of abnormalities of physio-

logical development), causing us to revise what we mean by "adulthood". Children become legally adult at 18, but their brains do not reach physical adulthood until they are almost 25. Until then they remain "plastic": everything they are exposed to can physically reshape them. Alcohol can damage and change the size, structure and function of adolescent brains. Teachers' brains aren't immune either: a study of 1,839 adults published in the *Archives of Neurology* found that the more alcohol an adult drinks, the smaller his or her brain.

Here is just a taster of the findings of some recent, well-controlled studies.

In teenagers who only binge-drink infrequently (four to five drinks once a month) bundles of cells in 18 parts of the brain are found to be thinner, with less protective coating, leading to

poor, inefficient communication between the cells. In teenagers who misuse alcohol, the parts of the brain important in emotional and impulse control – the prefrontal cortex – are found to be smaller and remain so even at the age of 21.

The hippocampus is a crucial developing brain area for memory formation and learning, vital in education. A team at the school of medicine at the University of California, San Diego, found that the hippocampus was noticeably smaller in teenagers who binge-drink about once every two and a half weeks than in non-binge-drinkers. These differences in hippocampus size are now associated with impeded learning of verbal material in teenage binge-drinkers who have not had a drink in over a month.

In 2009, researchers assessed 12 to 14-year-olds before they used any alcohol or drugs. Over time, some of the adolescents started to drink, in some cases four or five drinks in one session, two or three times a month – classic binge-drinking behaviour. Comparing those who drank with those who didn't, the study found that the binge-drinkers performed worse on thinking and memory tests involving spatial functioning, which affects things such as maths and engineering functions; boys showed poor performance on tests of attention, especially concentration.

The leading researcher spelt out the practical implications for parents of teenage pupils: "The magnitude of the difference is 10 per cent. I like to think of it as the difference between an A and a B grade in an exam." The study concluded that the effects may well "extend into adulthood".

A large-scale study by the US Department of Health found that about two-thirds of high-school students with "mostly As" are non-drinkers, while nearly half of students with "mostly Ds and Fs" report occasional binge-drinking. And the Division of Epidemiology and Prevention Research of the US National Institute on Alcohol Abuse and Alcoholism looked at the grade average of students aged 17 or older. It found that those who started drinking before the age of 13 were 46 per cent more likely to obtain at least one grade lower.

And even in the present, those who had been binge-drinking in the preceding 30 days were between 17 and 32 per cent more likely to have lower grades. The conclusion was clear: "The strong association between alcohol use and school performance found among US high-school students underscores the need to delay drinking onset and binge-drinking in this age group." And the negative relationship continues at university. A study of 9,931 students carried out by the Minnesota University health service found a linear relationship: as binge-drinking goes up, grade-point average goes down.

We can't stop teenagers from drinking, but we can explain that our legal drinking age of 18 has to be seen for what it is: a political and cultural compromise. The longer teenagers wait until they start drinking, the less they drink; and the older they are when they binge-drink, the less likely they are to be stupefied by it.

Presumably, after reading this summary, you may feel inclined to reach for the bottle yourself.

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