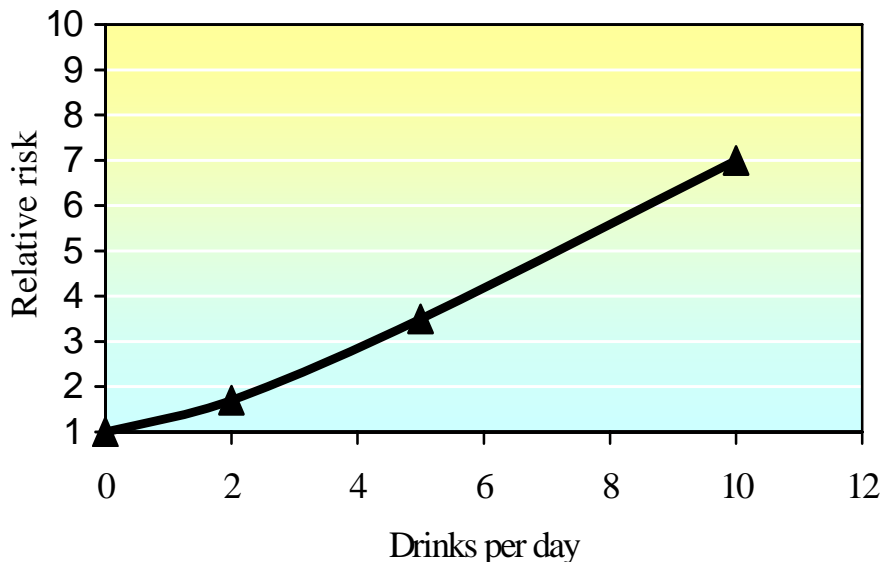


Alcohol produces dependence

No matter how drinking is measured, the risk of alcohol dependence increases with both the volume of alcohol consumption and a pattern of drinking larger amounts on an occasion¹. The association between alcohol consumption and dependence should not be seen as flowing in one direction only, i.e. from drinking to alcohol dependence. One of the characteristics of alcohol dependence is self-perpetuation. Once installed, dependence itself influences both the pattern and volumes of alcohol consumption, which in turn leads to the maintenance of dependence.



Relative risk of a range of alcohol dependence in relation to average alcohol consumption (drinks/day, where one drink is approximately 10g alcohol)

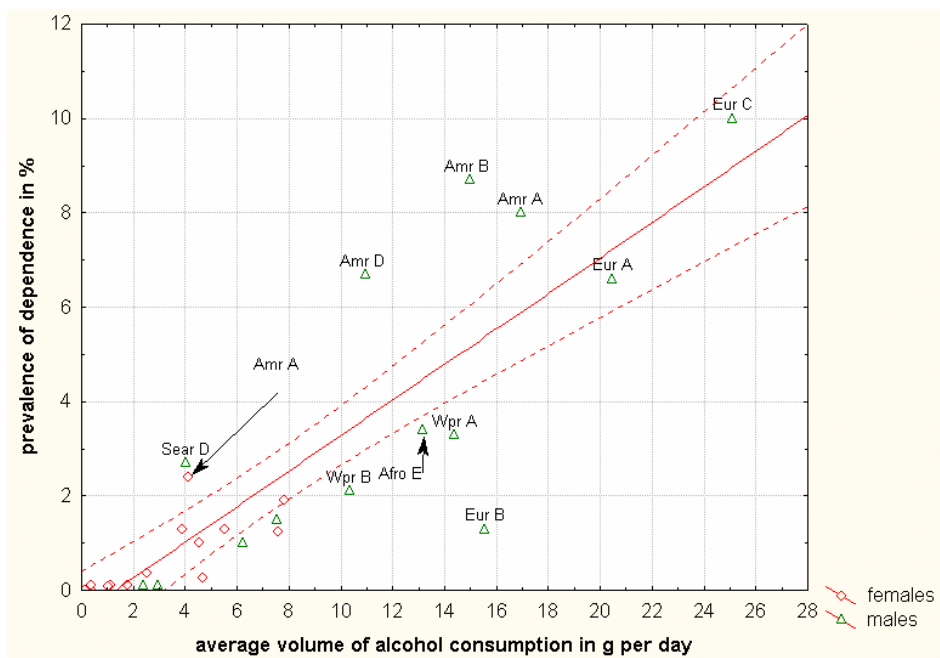
Alcohol dependence is particularly common amongst young adults, with frequent drinking at ages 14-15 years predicting alcohol dependence at age 20-21 years. There is a progression from alcohol use through harmful use to alcohol dependence, and an increasing risk of dependence with duration of exposure to alcohol. One half of people who eventually become dependent do so within ten years of the first use of alcohol, although the most severe forms of alcohol dependence are rare before the age of 30 years.

The two factors that contribute to the development of alcohol dependence are psychological reinforcement and biological adaptation within the brain². The pleasurable, rewarding effects of alcohol underlie its ability to act as a reinforcer leading to alcohol self-administration through operant conditioning. The core neural pathway believed to be the basis of this reinforcement is the mesolimbic dopaminergic pathway from the ventral tegmental area to the nucleus accumbens of the ventral striatum. Alcohol shares this reinforcement mechanism with other psychoactive drugs such as cocaine and heroin. Alcohol is also believed to achieve some of its rewarding effects through the endogenous opioid system.

The direct actions of alcohol on the brain and repeated alcohol exposure lead to longer term molecular changes in the brain known as neuro-adaptation. In many different brain receptors, neuro-adaptation counteracts or reverses the acute actions of alcohol. Upon removal of alcohol, the adapted system overcompensates in the direction of excitation, resulting in withdrawal symptoms such as hyper-excitability, anxiety, and even seizures. The neuro-adaptation that occurs with repeated alcohol exposure provides the basis for tolerance and dependence. Tolerance contributes to the development of alcohol dependence and harm. Tolerance facilitates increased intake of alcohol by diminishing the aversive responses to

alcohol and the physically incapacitating actions of alcohol such as sedation and locomotor impairment. Tolerance also reduces the positive, pleasurable effects of alcohol. The resulting increase in alcohol consumption can promote alcohol dependence.

Hippocrates, writing 2500 years ago, advised anyone coming to a new city to enquire whether it was likely to be a healthy or unhealthy place to live, depending on its geography and the behaviour of its inhabitants (“whether they are fond of excessive drinking”³). He continued “as a general rule, the constitutions and the habits of a people follow the nature of the land where they live”. The impact of the area and population in which people live is clearly demonstrated by studies of large scale migrations from one culture to another, in which, for example, an increase in risk factors and coronary heart disease is observed when individuals migrate from a low to a high risk culture and assume the lifestyle of the new culture. In other words, and this applies to many risk factors and conditions, including suicide, the behaviour and health of individuals are profoundly influenced by a society’s collective characteristics and social norms. This also applies to alcohol, where there is a relationship between prevalence of alcohol dependence and the overall per capita alcohol consumption. An estimated 23 million Europeans are dependent on alcohol in any one year.



Prevalence of alcohol dependence in relation to average volume of consumption for the different WHO regions of the world⁴

¹ Caetano, R. and Cunradi, C. (2002) Alcohol dependence: a public health perspective. *Addiction* 97 633-645.

² World Health Organization (2004). Neuroscience of psychoactive substance use and dependence. Geneva: World Health Organization.

³ Hippocrates (1978). Hippocratic writings. Edited with an introduction by G.E.R. Lloyd. Harmondsworth (Penguin).

⁴ Rehm, J. & Eschmann, S. (2002). Global monitoring of average volume of alcohol consumption. *Zeitschrift für Sozial- und Präventivmedizin* 47(1), 48-58.