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## IMPACT OF ALCOHOL CONSUMPTION ON ADOLESCENT HEALTH

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### INTRODUCTION

Underage drinking is the consumption of alcohol by an individual below the legal age limit to consume alcohol. The consumption of alcohol at a young age can have many adverse side effects on an individual's health, some of which can be long reaching. The aim of this review is to identify some of the adverse health effects caused by alcohol use at a young age with focus on the impact that alcohol consumption during developmental years has on brain development.

### DISCUSSION

There are a number of different factors which can have an impact on the increased likelihood of adolescent alcohol consumption, a number of which are described in Brown et al, 2009. For example, adolescent abusers are more likely than non-abusers to have: a positive family history of alcoholism, pre-existing mental health problems, low levels of self-regulation, been victims of sexual/ physical abuse, come from broken families/ have parents who poorly monitor their activities, beliefs that encourage excessive alcohol use and exposure to deviant peer models (Brown et al, 2009). Adolescents are a particularly vulnerable age group with respect to alcohol abuse and related problems, due to "The interrelated cognitive, biological, social, and affective changes that unfold during late adolescence" (Brown et al, 2009).

Alcohol use in adolescence is linked to numerous short-term and long-term health problems. Short-term risks include increase risk to self, due to poor decision-making. For example, in 1999 nearly 40 percent of people under age 21 who were victims of drownings, burns, and falls tested positive for alcohol (Bonnie et al, 2003). The long-term risks include, conditions such as pancreatitis, hepatitis, liver cirrhosis, hypertension, and anaemia (Bonnie et

al, 2003). While these risks are obviously a great concern, the deviation in brain development in adolescents that consume alcohol is equally worrying.

Contrary to what scientists once thought, the brain continues to develop throughout adolescence and into young adulthood, different regions mature at different times in development as cited by Spear, 2000 (Brown et al, 2009). Cognitive function and neural efficiency improve in late adolescence due to the neuro-maturational processes that occur (Gogtay et al. 2004). Synaptic refinement or “synaptic pruning” is a process that describes the reduction in the number of synapses, which can be detected as a decrease in the volume of cortical grey matter in an individual (Giedd et al. 1999; Gogtay et al. 2004), this is accompanied by an increase in the volume of white-matter which consists of myelin-covered nerve fibre bundles (Giedd et al. 1999; Paus et al. 1999). This active brain development is significant as the speed and efficiency of the transmission of neural signals is enhanced by these changes which appears to make the brain more vulnerable to neurotoxic processes (Windle et al, 2009; Spear, 2000)

There has been limited research carried out on human adolescents and numerous studies carried out on animal adolescents which demonstrate the potential for neurocognitive deficits along with structural and/or functional changes in the brain which were induced by alcohol consumption. (McQueeney et al. 2009; Spear 2000; Windle et al 2009). For example, deficits in visuospatial functioning and memory retrieval were associated with prolonged heavy alcohol consumption in a study of adolescents with Alcohol Use Disorders (Brown et al, 2009). There were differences found between control subjects and adolescents who were heavily involved with alcohol, in the imaging studies of brain structures of these individuals (Nagel et al, 2004). There were also differences noted in the longitudinal neurocognitive evaluations of community and clinical samples for these two groups (Brown et al, 2000). It was noted that adolescents who persisted in heavy alcohol consumption displayed greater deficits, however it is unclear what duration and levels of alcohol consumption are necessary to produce significant changes in brain function (Windle et al 2009)

## CONCLUSION

There are a large number of potential risk factors which may influence adolescents to consume alcohol. This age group are particularly vulnerable to the influences of others and are a stage in their development where the consumption of alcohol may have lasting effects on their brain development. While there are many other long and short-term consequences of adolescent alcohol consumption, the impact of alcohol on brain development is of interest as it may impact on the behaviours and cognitive function of the individual in the future. More studies are necessary to determine the amount and frequency of alcohol consumption necessary to have a significant effect, however it is clear from the referenced studies that abstinence from alcohol in the developmental years is ideal for optimal brain development of a maturing individual.

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