Research Report DCSF-RR067

Impact of Alcohol Consumption on Young People

A Systematic Review of Published Reviews

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Executive Summary

This review of reviews relating to the impact of alcohol consumption on young people was undertaken between May and October 2008 by a research team based at the Institute of Health and Society at Newcastle University. The work was commissioned by the Department for Children, Schools and Families (DCSF) - Tender No: eor/sbu/2008/007.

Aims and Objectives

The aim of the study was to undertake a systematic review of the published review literature and summarise the evidence on the harms and benefits of alcohol consumption for children and young people. In this process we assessed the quality of the evidence in this field and its relevance to a UK population. We also identified gaps in the research which need to be addressed.

Methods and Limitations

After a systematic search of the published evidence, 162 eligible reviews were found. These reviews were graded in terms of methodological quality and the strength of the conclusions that could be drawn from them. In the final narrative, 102 reviews were summarised to consider the impact of drinking on young people. The unused reviews consisted of duplicate material, older reviews and/or those of poorer methodological quality. This report takes the form of a narrative summary of the reviews' findings. For ease of reading, references are presented using the Vancouver system in which each one is represented in the text by a unique number and then all are ordered numerically in a reference list at the end of the report.

The evidence-base included many older reviews and there was a preponderance of research from the USA. In addition, the literature focused on adolescents and older teenagers but there was little information about prepubescent children. As a result, this body of work has limited generalisability to contemporary drinking by young people in England, particularly in younger children. Moreover, many of the reviews were methodologically weak and so it is not possible to discount bias from their findings. Lastly, most of the reviews were based on cross-sectional research which is unable to determine a causal link between risk factors and alcohol misuse, or indeed, between alcohol misuse and specific health or social consequences.

It is not clear whether current adult guidance on low risk drinking is pertinent to young people or if specific recommendations are required for individuals who are in the midst of ongoing physiological and emotional development. The review has confirmed that there is a lack of good review evidence available about the impact of drinking on children and young people. However, an absence of evidence in this field does not mean that there is evidence of no impact of alcohol on such individuals. Despite the methodological weakness of research in this field, there is a large body of evidence which reports consistent trends between alcohol use and a range of adverse effects. This convergence allows us to draw credible conclusions about the impact of drinking on young people (particularly around or following puberty).

Below we have summarised the review evidence on risks and protective factors that influence alcohol misuse by young people and also the possible adverse or beneficial consequences associated with children and young people drinking alcohol. We have noted areas where there were gaps or deficiencies in the evidence base.

I. Risks Associated with Alcohol Misuse in Children and Young People

The evidence suggests that there are a number of risk factors associated with alcohol misuse by children and young people. These include:

- a genetic predisposition (generational transmission)
- physical and sexual abuse in childhood, which may lead to later drinking behaviour
- early exposure to drinking alcohol, which may increase the risk of problematic drinking in adolescence
- behavioural patterns of alcohol consumption of parents, grandparents and siblings
- family history of alcohol problems
- early behaviour problems in children, which may place them at especially high risk of alcohol problems, particularly if there is a family history of alcohol problems
- antisocial behaviour and inter-personal problems in pre-adolescent children, which may be predictive of substance use disorders
- children and young people who are sensation-seeking or have impulsive personality types may drink in large quantities
- heavy and binge drinking by young people can be a mechanism for coping with stress or anxiety
- there may be gender differences between mothers and fathers in terms of their influence on the behaviour of sons and daughters
- involvement in drinking games can lead to very high levels of alcohol consumption
- Mechanisms to protect children and young people, such as excessive criticism of their drinking behaviour, may not be protective but harmful.
- Young people should be advised and supported to rely less on alcohol to facilitate social integration with their peers and to develop other more constructive peer group relationships.

II Protective Factors that Inhibit Alcohol Misuse in Children and Young People

Protective factors are very important as they can ameliorate risk factors. Our examination of the evidence about protective factors has shown that:

- the location of a young person's first drink may be important to future alcohol misuse, children who first use alcohol in a home environment and learn about its effects from parents are less likely to misuse alcohol than those who begin drinking outside the home and experiment with peers
- delaying the time of a young person's first drink may reduce the risk of harmful drinking.

- having adults who retain good relationships with a young person, characterised by appropriate levels of support and control, is likely to be protective

- controlled alcohol use is not in itself predictive of negative outcomes

- religious affiliation, especially attendance at religious services, may have a protective effect against alcohol consumption

- Key factors that seem to buffer the adverse effects of alcohol consumption in children and young people include informed and supportive parental guidance about alcohol and a delay in the age of initiation into drinking.

III Adverse Consequences of Drinking Alcohol for Children and Young People

We are able to say with confidence that there are potentially adverse consequences for children and young people who misuse alcohol. The evidence suggests that:

- adolescents who misuse alcohol are more likely to suffer from side effects including appetite changes, weight loss, eczema, headaches and sleep disturbance

- the most common impacts of alcohol intoxication are vomiting and coma

- young people are not immune to the chronic diseases and conditions associated with excess alcohol consumption in adults, and deaths from liver disease are now occurring at younger ages

- adolescents and young people who drink and drive, or allow themselves to be carried by a drink driver, are more likely to be involved in a car accident

- adolescents and young people who drink alcohol are more likely to sustain an injury, often as a result of an assault

- alcohol abuse in adolescence, during a developmentally sensitive period, poses a particular danger to the emerging brain faculties of executive functioning and long term memory

- adolescents are likely to be more vulnerable than adults to both subtle brain damage and long lasting cognitive deficits following alcohol exposure

- alcohol may increase feelings of depression

- stress / anxiety based drinking is associated with long-term and more severe negative outcomes

- there is a relationship between adolescent alcohol use and mental health problems, so it is important that all young people with alcohol problems should have a mental health assessment

- alcohol consumption during an evening may affect a child's performance at school on the following day, since it takes time to metabolize alcohol and this process varies depending on the dose of alcohol that was consumed and differing metabolic capacity

- the evidence shows that there are associations between alcohol consumption and subsequent behaviour with peers and friends. Indeed, excessive alcohol use can be

detrimental to a young person being able to maintain friendships, particularly if the consumption levels are higher than among the peer group generally.

Moreover, there is evidence that

- young people of college age who use alcohol are more likely than their abstaining peers to use cannabis
- alcohol consumption can have a detrimental effect on young people's short term educational performance
- students are more likely to miss classes because of drinking
- alcohol consumption by young people, particularly students, is more likely to make them vulnerable to being the victims of crime
- alcohol may make some young people more likely to display aggressive behaviour, although it is likely that other factors such as their personality and family life will play a role

In relation to sexual health and behaviour, the evidence confirms that alcohol consumption is associated with:

- not using a condom during a young person's first sexual encounter
- an increased likelihood of having sex and at a younger age
- unprotected sex
- teenage pregnancy
- the likelihood of contracting sexually transmitted diseases

IV Positive Consequences of Children and Young People Drinking Alcohol

While the negative consequences of alcohol misuse are considerable and must be taken seriously, there is evidence of some positive impacts associated with young people being able to drink sensibly. For example, the evidence shows that:

- some young people may benefit by having increased confidence when communicating with members of the opposite sex
- alcohol use at certain levels (undefined) can increase young peoples' feelings of sociability
- drinking alcohol as a means of celebrating and on special occasions may also be positive for young people.

Concluding remarks

There are many adverse consequences of drinking alcohol during childhood and adolescence which would seem to outweigh the modest number of positive impacts. Overall, it seems that delaying the age of alcohol initiation and limiting the amount drunk by young people is likely to enhance their health and well-being.

The review literature has significant evidence gaps in the area of alcohol use by, and its consequences in, children and young people. A key gap is the lack of information about the precise amounts of alcohol that lead to adverse consequences. Also the majority of the evidence in this field relates to older youth (adolescents and college/university students). There is a real need for more research relating to younger children, since it is clear that alcohol drinking can and does occur prior to puberty in some UK children.

This study has been constrained by the material that is currently available in published reviews. More progress is likely to be made by a systematic review of primary data in this field. However, there is also a clear need for more well-designed prospective studies in UK populations which measure alcohol use with precision and which characterise the range of possible adverse effects of drinking. There is also a requirement, in population studies, for multivariate analysis of key predictor variables in such a way that can control for possible confounding factors. Lastly, there is a need for longitudinal studies that follow-up younger people who drink to identify impacts over the longer term.

1. Introduction

1.1 Background

In England, the proportion of young people aged between 11-15 who reported having drunk alcohol decreased from 62% to 54%, between 1988 and 2007. However, the amount consumed by the young people who drink increased from 6.4 units per week in 1994 to 12.7 units per week in 2007 [1]. The largest increase was seen in 14 year olds who increased their alcohol consumption from 6.1 to 9.9 units per week over this period. Furthermore, this increase was not gender specific. For both boys and girls there was a substantial increase in the amount of alcohol consumed [1]. Moreover, one in four young people aged 14 reported consuming over 10 units of alcohol on their last drinking occasion; this level of consumption increased to one in three by the age of 15 [2]. In 2001 it was reported that young people's drinking tends to be confined to fewer days than adults, and in particular at weekends [2]. Thus young people (aged 11-15), who drink, tend to do less frequently but at a higher intensity than adults.

In young people (aged 16-24), the latest NHS Information Statistics on Alcohol (2008) reported that 26% of males and 24% of females drink over the recommended weekly limits for low risk drinking in adults, which are 21 units for men and 14 units for women. Moreover it is shown that 9% of young males and 6% of young females drank over 50 units per week which is indicative of high risk drinking in adults [3]. It is not clear whether current adult guidance on low risk drinking is pertinent to young people or if specific recommendations are required for individuals who are in the midst of ongoing physiological and emotional development.

During the last 30 years the number of deaths due to chronic liver disease and cirrhosis has risen steadily in England [4] and this trend is particularly marked in the 25-34 year group with the number rising from 16 in 1970 to 68 in 2000 for men and from 7 in 1970 to 60 in 2000 for women [4]. The majority of liver disease in this country is due to heavy drinking [5]. However, the most significant physical health risks associated with alcohol consumption in young people at the present moment are those relating to accidents and injuries. The ESPAD study [6] reported that 13% of all 15-16 year olds had been involved in an accident or had an injury as a result of drinking [6].

In Scotland, it has been reported that on a daily basis, 15 children under the age of 17 attend Emergency Departments, intoxicated and in need of medical assistance or treatment [7]. Indeed an audit of 21 emergency departments over a 6 week period showed that 648 children and young people under the age of 17 required medical treatment; 15 of these cases were below the age of 12 and one was as young as 8 years old. On average these young people had consumed 13 units of alcohol within the 24 hours leading up to their attendance [7]. If this number were to be extrapolated for England it would give an estimate of around 1245 young people per week requiring medical assistance or treatment in England (64,750 per year).

In England some 35,472 young people aged 16-24 were admitted to hospital in 2005 with alcohol-related conditions [8]. The largest proportion (19,533) were male and the figures increased with increasing age [8]. Whilst it is clear from these figures that excessive drinking by young people is a significant concern in the UK, it is not clear what impact this alcohol misuse has on their health and well-being beyond the immediate hospital episode.

Heavy drinking by young people is more pronounced in areas with high social deprivation. The highest levels of alcohol consumption are reported by young people in the North-East of England and Yorkshire and Humberside where they are 1.5 times more likely to have drunk alcohol during the last week than young people living in the rest of England [1]. In 2008, a survey of 1,250 young people living in deprived communities in Britain found that over a third did not know what a unit of alcohol was and did not understand the term binge drinking. Of these young people, 39% drank up to 20 units per week and 15% drank over 20 units per week [9]. Thus the adverse effects of social deprivation on young people may be compounded by possible health and social problems related to heavy drinking.

In a survey of school children aged 15 and 16 from the North West of England, participants reported that being aged 16, receiving a greater amount of income per week and not having a hobby or being a member of a club or sports team was associated with higher levels of alcohol [10]. In addition, a higher percentage of girls reported drinking in public places whilst a higher percentage of binge drinkers were male [10]. The 2005/2006 Health Behaviour in School-aged Children (HBSC) Survey (on patterns of health among young people in 41 countries and regions across Europe and North America) provides an international comparison [11]. Notably, findings suggest that young people in the UK have some of the highest rates of drunkenness internationally. England had the highest proportion of girls (24%) that reported that they had first been drunk at the age of 13 or younger. Rates for English boys were also high 23% reported they had been drunk at age 13 or younger [11].

Thus there are clear grounds for concern about alcohol consumption in young people in England and it seems that many aspects of young people's drinking may be situational or culturally determined. Moreover, whilst there is some evidence that parents' attitudes about alcohol may shape their children's views (particularly in younger children) about drinking [12], it seems that other direct mechanisms such as access to pocket money and involvement in diversionary activities (or not) may also determine if, when and how much their children drink. However, it is currently not clear to parents what risks arise for their children from early exposure to, or different levels of, alcohol consumption. Many parents may feel that early introduction to alcohol by them is preferable to its use in unsupervised experimentation. However, there is currently insufficient information to base such decisions on.

In adults there are some health and social benefits associated with alcohol consumption. However, the health benefits are linked to cardio-protective effects of low to moderate consumption of alcohol which have generally been identified in older adults, that is men aged over 40 and post-menopausal women [13, 14]. The positive social effects of drinking are well known to the majority of the adult population that chooses to drink alcohol, although these effects are rarely studied in research terms. In young people, it is not clear whether there is any health benefits associated with drinking in early life. It is likely that young people will perceive positive social effects of drinking [15]. However, it is possible that these may be tempered by adverse consequences that may arise from drinking at an age before alcohol is legal.

On the basis of current epidemiological evidence on adverse consequences of drinking, particularly in young people who become intoxicated, the alcohol harm reduction strategy for England has highlighted that underage drinking is a major public health priority [16] and outlined three objectives for tackling it:

1. Delaying the onset of regular drinking, primarily by changing the attitudes of 11-15 year olds and their parents about alcohol.
2. Reducing harm to young people who have already started to drink.
3. Creating a culture in which young people feel they can have fun without needing to drink.

Recent NICE guidelines on alcohol interventions in schools [17] and the Government's recent Youth Alcohol Action Plan also set out clear priorities concerning alcohol and young people under the age of 18. One of the actions in the Action Plan is to issue advice to parents about young people and alcohol, which will include guidelines for low risk drinking [18]. This 'guidance will also offer wider information on the health and social impacts of drinking at young ages, sources of help and support for parents including evidence-based approaches for them to use with their children' (page 18) [18]. Furthermore, the 2007 Chief Medical Officers Report recognised that young people's health is the key to the nation's future. He identified six priority risk-taking areas of which one was alcohol and drugs [19].

In order to inform the proposed guidelines on alcohol and young people, this review was commissioned to identify published evidence on both the harms and benefits of drinking in early life. Given that there was a limited time-frame available for the work, the commissioning brief asked for a focus on existing reviews in this field. The purpose of this work was to provide an assessment of this evidence to an expert group of clinicians/researchers convened by the Department for Children, Families and Schools to enable them to make recommendations to parents about their children's drinking.

The aim of the study were to:

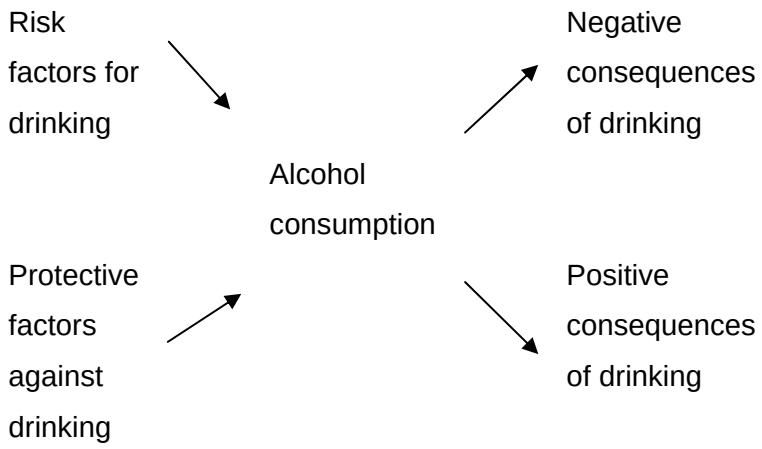
- produce a thorough review of the most up-to-date, robust and reliable evidence on the harms and benefits of alcohol consumption for children and young people;
- undertake a systematic search of existing reviews and weigh-up the quality of the evidence base;
- communicate and discuss the findings with the expert panel on alcohol and young people;
- support the Department in accurately and appropriately interpreting and using the evidence;
- ensure the guidance for parents is based on a firm evidence base; and
- identify evidence gaps that longer term research needs to address.

1.2 Operationalising harms and benefits of alcohol in young people

The harms and benefits of drinking can be considered not only in terms of what happens to young people after they have consumed alcohol but also in terms of risks and protective (or resilience) factors that influence this behaviour. The issue of risk and protective factors influencing substance use in young people has been discussed in detailed elsewhere [20]. In essence, risk factors are personal attributes or situational and/or environmental contexts that increase the likelihood of engaging in a behaviour (or the extent to which they engage in this behaviour) which adversely affects an individual. Conversely, protective factors are personal attributes or situational and/or environmental contexts that buffer, reduce or inhibit the behaviour in question. In this review we consider both possible influences leading to drinking and consequences resulting from alcohol consumption in young people (see Figure 1).

Figure 1:

Predictors of and risks to children who drink



Resilience against and benefits of drinking

2. Methods

Given the existence of several reviews examining the social and/or medical impact of alcohol on young people, this study comprises a synthesis of published reviews (a review of reviews) to establish an up-to-date and robust picture of the available and authoritative evidence in this field. Standard systematic reviewing methods were tailored to utilise existing reviews rather than primary research [21].

2.1 Criteria for including studies in the review

Study design

The term “review” can be used to describe a wide range of work, from an expert commentary on a topic, a narrative description of several papers in a field or a full systematic review. The latter involves: a pre-specified question and protocol; a defined search strategy; clear inclusion and exclusion criteria for studies; a clear quality assessment of included studies and, if appropriate, meta-analysis or pooling of data across similar research studies in a field.

It is generally accepted that a systematic review is the most likely form of review to minimise bias, as it uses a transparent approach that attempts to access all the relevant information of a topic. Thus we developed a checklist of methodological criteria to assess the quality of the reviews that were identified by our own systematic review process.

Participants

As 5 is the age when children can legally drink alcohol in the home, the main focus of the review was on children aged 5-19 years [22], but young adults aged 20-25 years were also included. We were directed not to include foetal exposure to alcohol as part of this work.

Behaviour

Reviews were considered if they included studies on the consumption of alcohol and its impact on the health of the drinker and / or his / her family, friends or associates. We were interested in establishing both adverse and possible beneficial impacts of drinking. In addition, we were interested in reviews which reported the assessment of any differences in risks associated with different patterns and levels of consumption.

Setting

Any setting was acceptable for inclusion.

Outcome

Outcomes of interest included direct harms to physical, social or mental health of the drinking individual (e.g. cirrhosis, alcohol dependence, depression, social); indirect harms to the health of the drinking individual (e.g. injuries from an increase in risky behaviour); social harms to the drinking individual or their associates (such as aggression within the family, criminality and educational effects); or predictors of harm. Also of interest were social and psychological benefits, and protective factors that might increase resilience for the drinking individual in terms of alcohol. Potential confounders, such as behavioural or emotional disorders that may have preceded alcohol use, were noted.

Exclusions

We excluded reviews which focused on interventions which aimed to delay the onset of drinking or reduce alcohol consumption in young people who drank. Due to limitations of time and resources, non-English language papers were also excluded.

2.2 Search strategy for identification of studies

Databases

Since the focus of the search was reviews, sources relating to unpublished literature (such as conference proceedings and other grey literature) were not employed. The Cochrane Database of Systematic Reviews (CDSR) and the Database of Abstracts of Reviews of Effectiveness (DARE) were also not searched, since by definition their contents are reviews of interventions, which were excluded from the scope of this review. The following electronic databases were searched for relevant reviews:

- ETOH Alcohol and Alcohol Problems Science database (1972-2003)
- TRIP (May 2008)
- MEDLINE (1950-May 2008)
- EMBASE (1980-May 2008)
- CINAHL (1982-May 2008)
- PsycINFO (1806-May 2008)
- Social Science Citation Index (1970-May 2008)
- Science Citation Index (1970-May 2008)
- Scopus (1996-May 2008)

We also used key words (see below) to search the following websites

- Institute http://www.intute.ac.uk/
- Department for Children, Schools and Families http://www.dcsf.gov.uk/
- Department of Health http://www.dh.gov.uk/en/Publicationsandstatistics/index.htm
- Home office http://www.homeoffice.gov.uk/rds/alcohol1.html
- UK Statistics Authority http://www.statistics.gov.uk
- EU Statistics UK http://www.eustatistics.gov.uk/
- NHS Information Centre http://www.ic.nhs.uk/
- UK Data Archive http://www.data-archive.ac.uk/
- NICE http://www.nice.org.uk/
- WHO http://www.who.int/topics/alcohol_drinking/en/
- Alcohol Concern http://www.alcoholconcern.org.uk/
- Alcohol Education and Research Council http://www.aerc.org.uk/
- National Center on Addiction and Substance Abuse http://www.casacolumbia.org/
- Alcohol and Drug Abuse Institute http://depts.washington.edu/adai/
- Australian Drug Information Network http://www.adin.com.au/
- SoRAD http://www.sorad.su.se/
- Diversity Health Institute Clearinghouse http://www.dhi.gov.au/clearinghouse/default.htm
- European Alcohol Policy Alliance http://www.eurocare.org/
- ADCA library http://tinyurl.com/4t8ds2
- DrinkandDrugs.net http://www.drinkanddrugs.net/
- Daily Dose http://www.dailydose.net/
- Google and Google Scholar http://www.google.co.uk
- NIAAA: http://www.niaaa.nih.gov/

Search terms

Search terms were agreed following a scoping search by the information specialist and in-depth discussion with the review team. The search was split into 3 concepts: alcohol, youth and study design. Other inclusion criteria listed above (such as outcomes) were not specified in the search strategy since there were no limitations according to these criteria (any type of outcome might be relevant). The following sets of alternative terms were combined together, using relevant thesaurus headings and truncation appropriate to each database.

Set 1: alcohol-related behaviour

Alcohol consumption, alcohol use, alcohol misuse, alcohol abuse, alcohol intoxication, alcohol drinking, alcohol disorder, alcohol dependence, binge drinking, binging near alcohol, social drinking, risky near drinking, drinking near occasion, intoxicate, alcoholism, alcoholic, drunk, booze, beverage, wrecked, pissed

Set 2: participants

Young people / person, kid, adolescent, teenager, youth, child, underage, student, college, university, school, delinquent

Set 3: study design

Review, meta-analysis

An example search strategy for the ETOH database is given in appendix 1. Search strategies for other databases are available upon request.

2.3 Review strategy

Assessment for inclusion

Titles, citations and abstracts were downloaded into Endnote X libraries for processing. Nearly 6,000 titles and abstracts of potentially relevant reviews were independently examined in Endnote by two reviewers on the team to exclude references which clearly did not meet the inclusion criteria. Full text papers of 700 reviews were independently checked for inclusion by two reviewers. The 700 reviews were scrutinised to ensure that they were reviews and that they were relevant to the study. Differences in opinion between the two reviewers were resolved by discussion, leaving 156 eligible reviews. A further 6 reviews that had not been found within the searches were included. These 6 reviews were identified through checking our own files, reference lists and word of mouth. Of the 162 papers that were identified, 102 were used in the final report. The 62 that were not used included evidence that had been updated within the 102 that was used.

Quality assessment

All 162 papers were quality assessed using the Scottish Intercollegiate Guidelines Network (SIGN) [see below] [23].

Levels of evidence

1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias

1+ Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

1- Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++ High quality systematic reviews of case control or cohort or studies
High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2+ Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2- Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3 Non-analytic studies, e.g. case reports, case series

4 Expert opinion

Grades of recommendations

A At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; *or*

A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 1++ or 1+

C A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 2++

D Evidence level 3 or 4; *or*

Extrapolated evidence from studies rated as 2+

The results of the grading are shown in appendix 6 for all 162 of the reviews found and also summarised at the end of each section of the report. The country where the research relates too is shown where known. A flow chart describing the identification of included reviews is given in appendix 4. Referencing was carried out using Endnote X and the Vancouver referencing system.

3. Findings

One hundred and sixty two reviews were found that met the criteria. Of these 102 were used in the report.

The evidence-base included many older reviews and there was a preponderance of research from the USA (appendix 6). Thus this work has limited generalisability to contemporary drinking by young people in England. Many of the reviews were methodologically weak and so it is not possible to discount bias from their findings (table 1). Lastly, most of the reviews were based on cross-sectional research work which is unable to determine a causal link between risk factors and alcohol misuse or indeed alcohol misuse and specific health or social consequences.

Thus there is a lack of good review evidence about the impact of drinking on young people. However, an absence of evidence in this field does not mean there is evidence of no impact. Despite the methodological weakness of work in this field, there is a large body of evidence which reports consistent trends between alcohol use and a range of adverse effects. This convergence allows us to draw reasonable conclusions about the impact of drinking on young people.

Table 1: Grading of reviews used / not used in report

Level	Grade	Reviews cited	Reviews not cited
1++	A	2	0
1+	B	7	1
1-	B	0	0
2++	B	4	0
2+	C	15	9
2-	C	48	24
3	D	25	23
4	D	1	3
		102	60

4. Findings - Health

4.1 Acute and chronic health problems

As alcohol-related diseases such as liver cirrhosis, cancers and heart disease take time to develop; chronic effects resulting directly from alcohol misuse are rarely seen among young people. Thus it is the shorter-term acute effects of alcohol consumption that are more evident in this population. In particular, acute intoxication can occur rapidly and by surprise in children and young people which is probably due to a combination of physiological factors (e.g. limited ability to metabolise alcohol and lower body weight) and socio-cultural reasons (including a lack of experience of the effects of alcohol and drinking in unsupervised contexts). The most common impacts of alcohol intoxication are vomiting (~ 60% of children hospitalized for alcohol use) and coma, which in cold environments can result in fatal hypothermia [24].

Acute health problems

Newburn and Shiner (2001) report that it is highly likely that children's inexperience of the effects of alcohol intoxication, and the fact that they are more likely to consume alcohol in 'risky' environments brings with it an increased risk of accidents and injuries leading to the need for hospitalisation [2]. Alcohol use may be a significant contributor to injury in adolescence and may play a role in more than 50% of traumatic brain injuries in adolescents [25]. Alcohol use was also linked to 80% of adolescent deaths from homicides, suicides and unintentional injuries [26] and to an increased risk of illness and death at an early age, predominantly caused by suicide and violent accidents [27]. Irwin and Millstein (1986) reported that adolescents who were involved in drowning, falls and burns had a greater frequency of blood alcohol levels over 0.10% [28]. It should be noted that reviews in this area are often unclear as to whether hospital presentations relate to acute alcohol effects such as alcohol poisoning, to the consequences of drinking, such as injury or to chronic conditions although the latter are rare in young people [29].

Table 2 shows alcohol attributable fractions (AAFs) for a range of health-relevant conditions, broken down by age and sex; these figures are based on global data [30]. The numbers show the proportion of deaths in the respective injury category attributable to alcohol based on population-weighted averages of the regional estimates (only ages 0-29 are shown below). The highest fractions are in the 15-29 year old group and occur in males dying from motor vehicle accidents, poisonings and other unintentional injuries [30].

Table 2: Alcohol attributable fractions (AAFs) for young people

	Age years					
	0-4		5-14		15-29	
Injury category	Female	Male	Female	Male	Female	Male
Unintentional injuries						
Motor vehicle accidents	0.07	0.11	0.07	0.11	0.09	0.32
Poisonings	0.00	0.00	0.00	0.00	0.16	0.26
Falls	0.00		0.00	0.00	0.10	0.20
Fires	Causal relation to alcohol but not sufficient data to estimate alcohol-attributable fractions					
Drowning	0.00	0.00	0.00	0.00	0.18	0.24
Other unintentional injuries	0.03	0.11	0.03	0.11	0.16	0.26
Intentional injuries						
Self-inflicted injuries	0.00	0.00	0.00	0.00	0.07	0.14
Homicide	0.09	0.09	0.09	0.09	0.19	0.25
War	No clear evidence that alcohol is causally related					
Other intentional injuries	0.00	0.00	0.00	0.00	0.14	0.19

In the US alcohol-related road accidents are the greatest cause of death and injury amongst undergraduate students in the US [31]. Sindelar et al. (2004) reported that 13-19% of all adolescents involved in a car accidents tested positive for alcohol [29]. The highest rates of drink driving mortality, arrests for drunkenness and drink driving were in the 18-24 year old population [32].

With regard to accidental injury other than those caused by road accidents, adolescents and young people of college age are more likely to be injured than their abstaining peers. Significantly, the cause of injury was frequently assault [29].

Thunstrom (1988) identified a particularly high risk group of young people comprising about 20% of young people admitted to hospital for alcohol intoxication. This high risk group consisted of mostly boys from lower socio-economic status groups, who before the acute episode of drunkenness had shown signs of ‘psychiatric insufficiency’, or extreme shyness and a retiring disposition, or restlessness, impulsiveness and aggressive behaviour [27]. Such individuals often had difficulties in social adjustment, including problems at school. These children had also been brought up in homes characterized by insecurity, broken families with only one parent (who was often an ‘exhausted’ mother), with an alcoholic or a mentally disturbed parent or in a home marked by disorganization with few good emotional relations. It was also reported that the children had been using alcohol before the acute episode (no information given on use). They were often apprehended on a week day and neither they themselves nor their parents showed notable anxiety reaction with regard to the admission to hospital. This review concluded that in this ‘high risk’ group of children the acute episode of alcohol intoxication was a warning signal for future problems. This compares to a low-risk group (comprising about 50-55%) of cases that would be seen as healthy children from a psychiatric point of view, from secure homes that have shown no previous signs of social maladjustment. They are generally admitted to hospital on a Friday or Saturday night and both they themselves and their parents show anxiety reactions in connection with the event [27].

Chronic health problems

It is widely known that prolonged alcohol abuse has numerous longer-term harmful health effects and adolescents are not immune to these risks. Zeigler et al. (2005) reported a comprehensive exploration of the deleterious physiological effect of drinking at a young age [25]. In common with earlier work, these authors found that while chronic diseases are relatively uncommon in adolescents who misuse alcohol, these individuals experience significantly more medical symptoms than those who don't misuse alcohol, including appetite changes, weight loss, eczema, headaches, and sleep disturbance [25].

In summary, the current review found very little evidence relating to liver disease in young people. Saunders and Bailey (1993) reported that the overwhelming majority of deaths from liver disease occur in the over 21's [33]. Moreover, Clark et al. (2002) reported that serum liver enzymes were typically only modestly elevated in adolescents with alcohol problems [34]. However, Zeigler et al. (2005) later found that serum enzymatic markers of liver damage were elevated in alcohol-abusing adolescents [25]. Whilst there is great inter-individual variability in susceptibility to alcohol-related liver disease, two notable risk factors are the dose of alcohol consumed [35] and the length of time of heavy drinking [36]. Deaths from alcoholic hepatitis or decompensated cirrhosis are rare in patients under 25, but when these deaths do occur, they are as a result of several years of heavy drinking [37]. Thus although there is no direct evidence that adolescent livers are more susceptible to alcohol than adult livers, the consequences of heavy drinking in adolescence are now being seen in early adulthood with devastating consequences.

Levels of evidence

Of the 10 reviews used in this section, 1 was categorised as 1+ (A); 5 as 2- (C) and 4 as level 3 (D). Although methodologically one review was good quality with a low risk of bias, the majority of the evidence was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

4.2 Genetics

Relatively little research on the genetics of alcoholism has focused specifically on young people [38]. This may be due to their short drinking histories so that they generally do not show signs of severe alcohol dependence, however Boyd et al. (2005) suggested that 'genetic predisposition … may mediate relationships between developmental transitions' (such as starting college) and alcohol use [31]. For instance, membership of fraternities and sororities in US colleges is associated with higher rates of drinking [31]. However, those already predisposed to drinking may choose such environments [31].

Much of what is known about alcohol and genetics has been extrapolated from studies of adult alcohol use [38]. For instance, Hawkins et al. (1992) considered genetic influences using adoption studies [39]. The literature available at the time showed that among adopted children, 18-27% of the sons of alcoholic biological parents developed alcohol problems even when raised by adoptive parents, compared to 6% of the sons of non-alcoholic biological parents [39].

Studies have shown that that lifetime risk of alcoholism is apportioned roughly equally between environmental and genetic factors and these factor interact substantially [40] [41]. However, Rose (1998) reported that twin studies have shown the age of initiation (to drinking and to drinking to intoxication) and abstinence to be influenced by cultural or shared environmental (including parental abstinence) and not genetic factors [42]. However, identical twins compared to non-identical twins were more similar in drinking frequency and

these differences between genetically identical and non-identical twins increased with experience of alcohol, an environment facilitative of alcohol use allows genetic predispositions to emerge. However, Rutter (2007) reported a ‘substantial shared genetic liability between the age at which an individual started drinking and the later development of alcoholism’ so that, according to this view, although there is likely to be some shared environmental contribution, age at initiation of drinking is predominantly a marker of predisposition rather than a cause of alcohol problems [38]. Similarly, a study of Korean children adopted by Caucasian US parents measured the gene for acetaldehyde dehydrogenase gene which is in two forms; one allele common in East Asians is associated with an unpleasant flushing experience with alcohol. Those with the variant linked to the flushing response have low rates of alcoholism. Adoptees with the variant, compared to those without, showed low rates of alcoholism but there were no between-group differences in rates of antisocial behaviour and drug abuse. This suggested that “the association (of early alcohol misuse, antisocial behaviour and drug misuse) was derived from a shared general liability for problem behaviour and not from the causal effect of early drinking” [38]. Furthermore, there was no effect of adoptive parental alcoholism on adolescent drinking; the major source of a familial environmental effect was sibling and not parental drinking [38].

Rose (1998) also reported that ‘individual differences in … risk relevant behaviours (relevant to emerging alcohol problems in late adolescence) are familial and moderately heritable’. Citing data from longitudinal studies, he comments that ‘as early as kindergarten and elementary school, behavioural ratings by teachers and classmates can help distinguish children who are more likely to abuse alcohol by middle to late adolescence’. In a Swedish longitudinal study behavioural dimensions derived from these ratings were termed ‘high novelty seeking and ‘low harm avoidance’. Data revealed that ‘Boys with these two childhood behavioural dimensions had a 20 fold higher risk of alcoholism’. Also, boys of alcoholic fathers were more persistently oppositional and hyperactive than matched controls. Detailed analysis suggested that ‘A boy’s alcoholism risk lies in his (disruptive) behavioural dispositions (which are heritable) and not in father’s alcohol use status’. A New Zealand multivariate study showed that the highest risk (of progression from initial… alcohol use to early alcoholism) was ‘among boys from disadvantaged homes who showed early onset conduct problems’. On the basis of similar findings from New Zealand and the US he concluded that, ‘… behavioural precursors of alcoholism are evident to trained observers in children as young as three and to teachers and classmates at the time of school entry’ [42].

Twin studies have shown that high risk children (of parents with alcoholism) exhibit more aggression and non-compliance (girls) and hyperactivity / impulsivity (boys) than control children. High risk twins are more likely to report their peers as smokers and experimenters with drugs and alcohol. These behaviours show stronger concordance in identical compared to non-identical twins and are regarded as significantly heritable.

Data from adoption studies suggest that the co-occurrence of alcohol misuse and depression requires experience of environmental adversity, such as being the non-adopted child of alcohol misusing parents or exposure to ‘adoptive parent risk factors’ [38].

Levels of evidence

Of the 4 reviews used in this section, 1 review was categorised as a 1+ (B); 1 as 2+ (C) and as 2 as2- (C). Although methodologically one review was good quality with a low risk of bias, the other 3 reviews found related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

4.3 Effect on brain development

Adolescence is a period of significant brain maturation [43]. In the second decade, brain functioning is enhanced by active myelination (where nerve fibres acquire a complex lipoprotein sheath) and the removal of redundant synaptic connections in the prefrontal cortex and limbic system [44]. The prefrontal cortex, which decreases in volume as it matures, governs such functions as: attention to tasks; integration of information from the different senses; impulse control; voluntary motor behaviour; planning, problem solving, abstract thinking, reasoning and judgement [25, 44]. Conversely, the limbic system structures (hippocampus, amygdala and septal areas) in the medial temporal lobes increase in volume. The hippocampus has a particularly important role in encoding long term memory and damage to these neurons can disrupt individual's ability to form new memories for facts and events [25]. As well as these morphological changes, adolescence brings significant neurochemical changes in brain synapses. Simply put, changes in brain volume affect the number of receptors that respond to circulating neurotransmitters such as Glutamate, an excitatory neurotransmitter which influences the process of learning and memory. A major inhibitory neurotransmitter in the human brain is Gamma-aminobutyric acid (GABA) which is potentiated by alcohol and which inhibits the action of glutamate. Hence increased levels of GABA contribute to depressant effects on cognition.

These structural and functional changes in the young brain continue until about 20 years of age [25, 43]. Because the adolescent brain is undergoing these dynamic changes, it is likely to be more susceptible to damage due to adverse environmental influences than the relatively stable adult brain [25, 45]. Since alcohol is both miscible with water and lipid soluble, it is readily absorbed from the stomach and intestine, distributed throughout the body it easily crosses the blood-brain barrier [25]. Indeed the concentration of alcohol in the brain parallels the concentration in the blood. Under normal circumstances about 98% of ingested alcohol is metabolised by enzymes in the stomach and liver and eliminated by the kidneys [25]. The average rate of metabolism is about 30 ml (1 oz) in 3 hours [25]. If alcohol is consumed at a rate greater than it is eliminated, blood alcohol concentration will rise until drinking stops.

Adolescents typically have less body mass than adults and have not developed the physiological or behavioural tolerance to alcohol and its effects [45]. Therefore they do not need to drink very much to become intoxicated. In addition, they tend to drink heavily and rapidly because their social, emotional control, thinking and decision making skills are less developed. This combination of factors may lead to short and mid-term effects on the brain. In addition, individuals who begin drinking early and continue to drink may experience longer-term brain effects.

Shorter-term effects

- Alcohol stimulates the release of endorphins giving the subject a sense of well being which can encourage continued drinking. Increasing intoxication leads to euphoria, loss of inhibition, reduced coordination, garrulousness and belligerence [45].

- With increasing blood alcohol concentrations subjects experience lethargy, cardio-respiratory depression.

- With further intake subjects develop stupor and coma that may end in death [25].

Mid-term effects

- Alcohol disrupts the sleep-wake cycle, altering total sleep time [46]. Consolidation of learnt material takes place in sleep and so this can be adversely affected by persistent

drinking. Research suggests that alcohol has a more profound effect on memory and learning in adolescents than in people who start drinking in later life.

- It has been reported that the fatal dose of alcohol in childhood could be as low as 3 grams/kg in a child compared to 5-8 grams/kg in an adult [24]. In a 30 kg ten year old this equates to 1.5 bottles of wine and in an adult to 5 - 8 bottles with presumably adolescents in the middle, depending on weight. The reduction though metabolism of 0.1 g/l/hr or 0.08/kg/hr - in the blood means that if a 75 kg adolescent had a blood level of 1g/kg after a bottle of wine, it would take ten hours for full elimination. Since there is at least a temporary effect of alcohol on memory, this young person could still have alcohol affecting their brain function in the school morning. So potentially there could be a problem with learning in school the morning after heavy drinking, in addition to the fatigue associated with the alcohol-related sleep disruption.

- Alcohol is also linked with depression, although it is not possible to determine if adolescents drink due to depression or if depression occurs as a toxic effect of alcohol consumption [45]. However, research on alcohol abusers has found significantly fewer locus coeruleus neurons in the brain stem compared to non alcohol abusers, suggesting that alcohol may change brain structure and thus trigger a behavioural response [25].

Longer-term effects

- In observational studies of subjects with chronic alcohol use disorders, both left and right hippocampal volumes were significantly smaller than in non users. Thus long-term memory may be affected by prolonged drinking [25].

- Using functional magnetic resonance imaging (fMRI) to measure blood flow to various parts of the brain, alcohol abusers have shown reduced perfusion (blood flow) to the prefrontal and parietal cortices, particularly in the right hemisphere during tasks of spatial working memory e.g. remembering location of objects [25, 44, 46]. Also subjects with alcohol dependence demonstrate diminished spatio-visual and motor speed responses [25, 44, 46].

- Alcohol also stimulates release of the neurotransmitter Dopamine which activates the Dopaminergic reward pathway [25]; this can make alcohol addictive, as both short term and long term exposure reinforces this pathway in the brain.

- Abstinence from alcohol after periods of heavy drinking sensitises N-methyl-D-aspartate (NMDA) receptors causing an influx of calcium ions into neurons as a result of their increased activity. This process is neurotoxic and causes cell degeneration.

Neurocognitive effects and risks

Adolescents have been found to be less vulnerable than adults to impairment of motor performance by alcohol and as a result have a tendency to drink much more than normal adults and achieve much higher blood alcohol concentrations before becoming incapacitated. Also the sedative effect of alcohol appears to be less profound in adolescents compared to adults [46]. This combination of maintaining motor function for longer and experiencing less sedation than adults means that adolescents can have a longer exposure to environmental risks whilst drinking [45]. For instance, younger drinkers may be more inclined to drive a car after drinking or feel that they can climb up a wall and maintain their balance.

Does alcohol cause brain changes?

For ethical reasons, it is not possible to conduct prospective research on the subject of alcohol use and brain effects in children and young people. However, the available observational evidence suggests that adolescents are likely to be more vulnerable than adults to both subtle brain damage and long lasting cognitive deficits following significant alcohol exposure [25].

Cognitive and learning impairments from chronic heavy exposure to alcohol can arise from the neuro-toxic effects of ethanol on vulnerable hippocampus and limbic structures. Research findings from animal models and observational human studies have shown that persistent alcohol abuse can result in a decrease in the overall volume of the hippocampus, the area responsible for long term learning and memory [25]. Cell volumes have been found to be consistently smaller in alcohol abusing adolescents and, perhaps unsurprisingly, the degree of hippocampal damage increases with the number of years of alcohol abuse [25]. In one observational research study cited by Ziegler et al. (2005) 38 adolescent alcohol abusers were compared with 69 non alcohol users on neuropsychological tests. The former scored consistently less well in verbal IQ, spelling and reading tests compared to the latter [25].

However it can not be overemphasised that there is a lack of evidence around this area. Much of the above work has focused on alcohol abusers rather than individuals with intermittent or low level use. In addition, the research relates to older adolescents rather than younger children. Nevertheless, from the research identified by this review, it is clear that alcohol abuse in adolescence can pose a risk to young people's brains due to the plasticity of this organ during an important developmental period.

Levels of evidence

Of the 6 reviews used in this section, 1 review was categorised as 1+ (B) and 5 as 2- (C). Although methodologically one review was good quality with a low risk of bias, the other 5 reviews were related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

4.4 Mental health

It has been shown that chronic alcohol consumption amongst adolescents may increase feelings of depression, because it causes serotonin levels to decrease [47]. Among youths engaged in substance misuse 60% are said to have some form of co-morbid psychiatric diagnosis [48]. It is argued that these are primarily youths with other, and "remediable problems" [48]. Pullen (1993) found that anxiety, depression, low self esteem and lack of success in attaining life goals were associated with drinking however they also cite a study by Chen and Lockhart (1989) that found that alcohol is not effective in producing a relaxation or anxiety / tension reduction effect [49].

Many of the reviews discuss the co-existence of the alcohol use and mental health problems as opposed to examining the temporal or causal relationship between the two difficulties, resulting in conclusions which are at times ambiguous. Citing adoption studies that showed increased levels of antisocial behaviour and substance use disorders in children of alcoholics who were adopted by non drinking adoptive parents, Wilens and Biederman (1994) reported that psychopathology 'aggregates with psychoactive substance use disorders'[50]. Also, antisocial behaviour and interpersonal problems in preadolescent children predicted psychoactive substance use disorders (PSUDs). Hawkins et al. (1992) reported that early and persistent behavioural problems, including evidence for negative mood, withdrawal responses, temper tantrums and aggression, predicted substance misuse and the transition from use to dependence upon substances [39].

Clark (2004) reported the increased risk of conduct disorder, ADHD, major depressive and anxiety disorders in the children of parents with alcohol problems compared to the children of parents without alcohol problems [51]. Clark (2004) also referred to cross-sectional and longitudinal data illustrating the close links between mental and alcohol use disorders in adolescence. He proposed that there is 'a common diathesis': this increases risk for 'psychopathologies that interfere with social functioning' but also for substance misuse and a range of risky behaviours including alcohol use disorders [52]. This diathesis appears to be linked with abnormalities in the myelinisation associated with maturation of frontal cortical networks [44] and is a potential 'parsimonious…organising concept', perhaps best characterised as 'psychological dysregulation' or 'neurobehavioural disinhibition'. Clark and Bukstein (1998) similarly suggested that alcohol misuse should be conceptualized as 'one of a number of deviant behaviours resulting from common risk factors…'[52].

Karam et al. (2008) suggested a relationship existing between alcohol use and anxiety levels [53]. However there are methodological concerns in this work, which place these findings under question. Importantly there was little or no evidence supporting recent public concern that ADHD (and prescribed medication for this condition) increases vulnerability to alcohol misuse [39, 54, 55].

Galaif et al. (2007) reported a 100% increase in suicide among 10-14 year olds in the years 1980-1999 and a 14% increase in 15-19 year olds [56]. They argued that major depression was the most common co-morbidity of completed suicide and that alcohol abuse increased the risk for depression by a factor of 6 and that there is a reciprocal 'synergistic' relationship between depression and alcohol abuse. There was however no findings regarding the causal relationship.

Alcohol use has been associated with cases of suicide in juveniles [33]. It has been estimated that alcohol is likely to cause male adolescents to be 17 times and females three times more likely to attempt suicide [47]. It is argued that alcoholism, depression and suicidal behaviour are associated with the same biological factors such as abnormalities in the serotonergic or hypothalamic-pituitary-adrenal systems [47]. It is possible that adolescents who use or abuse alcohol are at a greater risk of engaging in suicidal behaviour because

each factor (depression and alcoholism) independently increase the risk of suicidal behaviour and it is possible that they act in a synergistic fashion [47]. When looking at ethnicity, Caucasian adolescents were twice as likely as the African American victims to have used ethanol before committing suicide [47, 57]. Furthermore, mixing alcohol and certain medications can put adults and young people at risk for certain reactions [58]. Importantly serious reactions can occur whether they are taken at the same time or not. Informing young people of this will be particularly important [58].

Childhood sexual and physical abuse contribute significantly to the development of alcohol problems in females perhaps as a form of self-medication [59, 60], although no relationship was identified in males with similar traumatic experiences [60].

In summary, this literature as a whole suffers from limitations within the findings resulting in suggestive rather than confirmatory findings [56]. There is evidence that alcohol misuse and mental disorders aggregate together. An influential interpretation of the association is that it occurs because behaviour disorders and risk taking in general including alcohol misuse share a common genetically influenced 'diathesis' or predisposition that has been referred to as 'psychological dysregulation' [51]. It is important that all young people with alcohol problems should have a mental health assessment.

Levels of evidence

Of the 16 reviews used in this section, 1 review was categorised as 1+ (B); 2 as 2+ (C), 11 as 2- (C), and 2 as level 3 (D). Although methodologically one review was good quality with a low risk of bias and two as having a moderate probability that the relationship is causal, the majority of the evidence was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

4.5 Personality

Young people who drink in great quantities on a regular basis and who experience more negative consequences as a result of their drinking are more likely to be classified as impulsive, dominant, tough-minded, extraverted and sensation, pleasure or novelty seeking individuals [61-63]. Such individuals have also been characterised as showing disinhibition, deviancy, rebelliousness and less behavioural control as well as being non-conforming, radical and less committed to conventional values than less regular or lighter drinkers [61] [62].

However, Brennan et al. (1986) found conflicting evidence concerning the relationship between heavy alcohol use amongst college students and the presence of anxiety and neuroticism [61]. These authors concluded that two types of heavy drinkers existed, whose expectancies related to differing personality types; those seeking out of *stimulus- enhancing* effects and those seeking *tension-reduction* effects. Heavy-drinkers who were more neurotic were found to be more likely to drink to intoxication [61].

Saltz and Elandt (1986) examined the relationship between anxiety, anger or depression and the use of alcohol [63] and found that heavy drinkers reported feeling less anxious in dangerous situations and while interacting with members of the opposite sex. Both impulsive and sensation-seeking drinking and stress / anxiety-based drinking have been associated with both increased alcohol consumption and increased negative consequences. There is some evidence that stress/anxiety based drinking is associated with long-term and more severe negative outcomes [57]. However, even highly sociable drinking can result in negative consequences for college students [63].

Kuntsche et al. (2006) also linked ‘extraversion and sensation seeking’ and ‘neuroticism and anxiety’ to drinking motives [64]. The former correlated with enhancement factors and was most common in boys whilst the latter correlated with coping factors and was most common in girls. These associations varied across countries but not across different ethnic groups within the same culture. This review concluded that these two personality types may be gender-specific and that as drinking motives did not emerge until adolescence this may account for the increased severity of drinking problems in college populations. Although the latter is also likely to be influenced by such issues as growing independence in college students and the increased availability of alcohol in this context. Nevertheless, from a preventative perspective, it may be useful to focus on extraverted sensation seeking males who drink for enhancement motives and neurotic anxious females who drink for coping motives.

Dimensions of personality, such as a tendency toward sensation seeking, may relate not only to drinking but to the choice of drinking partners and drinking venues. Therefore it is necessary for future research to try and integrate all these variables and examine the influence of each of them on behaviour. Several researchers have begun examining multivariate models of individual differences among college students by taking into account demographic factors, drinking motives, expectancies and personality factors simultaneously [61, 65, 66].

Kuntche et al.(2005) refer to the ‘motivational model of alcohol use’ that a motive or reason is a ‘necessary condition for drinking’ [65]. They describe ‘four categories of drinking motives’. These include ‘…to enhance positive mood or well-being… to obtain social rewards… to attenuate negative emotions and to avoid social rejection’. Motives may be conscious or unconscious [65]. A related concept of alcohol expectancies refers to beliefs about the cognitive, affective and behavioural effects of alcohol which can be both positive (“drinking allows me to relax”) and negative (“when I drink, I often say things that I regret later”) [62].

Brennan et al. (1986) examined motives for drinking in college students and identified two general types of drinking motives: drinking for social purposes and drinking for emotional escape or coping purposes [61]. In fact five of the eight papers reviewed by Brennan et al. (1986) discussed alcohol consumption for coping purposes [61]. Conversely, Kuntsche et al. (2005) reported that the majority of drinkers volunteer social motives (e.g. to make a party more enjoyable) which were associated with moderate drinking[65]; drinking for coping purposes was associated with heavy drinking or binge drinking [65].

Burke and Stephens (1999) cite a study by Smith et al. (1995) in which 461 male and female seventh graders (around 12 years of age) completed questionnaires looking at their alcohol use and alcohol expectancies and were reassessed at 12 and 24 months. The results showed that when controlling for pre-existing alcohol use, positive alcohol expectancies was a significant predictor of both early alcohol initiation and subsequent higher levels of alcohol use. Low expectancy teenagers either did not begin to drink at all or increased their drinking only gradually [67]. A similar conclusion was also reached by Baer (2002) [68] and more recently in 2007 by Borsari et al. [62].

In summary, there appear to be some social advantages of alcohol consumption for college students, particularly during their first year at college when social identity is paramount. Indeed, enhancement motives such as drinking to have a good time or to enjoy a party more do not seem to have a strong association with alcohol problems. Drinking to cope with negative emotional states or to reduce tension is consistently associated with alcohol-related problems in college contexts. However, these high rates of drinking subsequently fall once students graduate from college [69].

Thus the expectancy that consuming large quantities of alcohol will produce positive effects such as reduction of social and sexual inhibition and indifference to potentially negative effects such as cognitive impairment is associated with high risk drinking. However, a direct relationship between personality type, alcohol expectancies and drinking behaviour cannot be conclusively drawn due to the cross-sectional and small-scale nature of the studies in this area.

Levels of evidence

Of the 9 reviews used in this section, 2 reviews were categorised as 2++ (B); 1 as 2+ (C); 4 as 2- (C) and 2 as level 3 (D). Methodologically, two reviews showed a moderate probability that the relationship is causal. The remaining seven reviews were related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

5. Findings - Social

5.1 Age of first drinking

Most young people are introduced to alcohol by their parents [70] and the majority of young people have had an alcoholic drink before the age of 16 [71]. Drinking at home under parental supervision often began in childhood. Coleman and Carter (2003) reported that the first experiences of drinking alcohol usually occurred between the ages of 8 and 12 years old [72]. However, one review reported that a third of 3-4 year old children could able to tell the difference between alcoholic and non-alcoholic drinks (using pictures) [73]. Also it has been reported that children as young as 6 or 7 years old have already developed attitudes about alcohol and have some knowledge about its use [74, 75]. Drinking in a parentally supervised environment tends to peak around the age 13 or 14 [71, 72]. Whilst boys often experienced their first drink younger than girls but these gender differences even out by age 13 or 14 [72].

A number of reviews reported that age of first use of alcohol is highly predictive of both continued use and frequency of use [25, 63, 76-79]. Harolyn et al. (1998) reported that the younger a child initiates alcohol and drug abuse, the higher the risk of serious health consequences and adult substance abuse [77]. More specifically, it has been reported that children who are introduced to alcohol before the age of 6 years are more than twice as likely to report frequent, heavy or problematic drinking at age 15 compared to children who were not exposed before the age of 13 years [80]. However, two reviews found that the age of the first drink neither predicted alcohol use by age 20 nor the consequences from alcohol abuse by age 30 [31] and that early drinking was only a modest predictor of heavy regular drinking in later life [33].

The effect of the age at which young people first consumed alcohol was explored in relation to later drinking behaviours in US college students. Saltz and Elandt (1986) reported that the older an individual was at the time of their first drink, the lower the college student's current alcohol consumption was likely to be [63]. College students who had their first drink in elementary school drank more heavily and at a higher frequency and experienced more negative consequences as a result of their drinking than students with a later initiation to alcohol [63].

However early onset of drinking does not always suggest higher long term risk. For instance, subsequent epidemiological data suggest that early puberty in girls is associated with early drinking but not adult alcoholism [38].

Zeigler et al. (2005) reported the number of young people aged 12-17 years from the USA who had used alcohol increased from 2.2 to 3.1 million between 1995 and 2000 [25]. In this review, most youths had their first drink around 12 years of age and the prevalence of alcohol use increased with age [25]. They also found that individuals who first used alcohol in the age range of 11-14 years had a much greater risk of subsequently developing alcohol abuse or alcohol dependence than children who started drinking later; it was estimated that 40% of children who start drinking before the age of 15 years would develop alcohol abuse or dependence [25]. Lastly they report that delaying the time of a young persons first drink may reduce significantly the risk of harmful drinking [25].

Vingilis (1981) investigated the location of early drinking behaviour and reported that 20% of adolescent 'delinquents' (students who had been in trouble with the law) had had their first drink in the home environment compared to 75% of law-abiding students [81]. Thus the location of the drinking initiation may be important for future outcomes, however the data in this study related to 1967 [81]. Donovan (2004) reviewed research on parental norms and the onset of drinking and via survival analyses showed that higher levels of parental alcohol

and drug use and more permissive parental attitudes about teen drinking were linked to earlier alcohol initiation in children [82]. Lieberman (2000) reported that children who learned from their parents that alcohol use led to positive outcomes had a greater risk of alcohol-related problems than those who learned more negative expectancies [83]. Lastly, whilst York (1999) stated that early alcohol use was linked to later alcohol misuse and / or problems, they cautioned that but that the exact biological and social mechanisms were disputed and that a causal relationship had not been demonstrated [84].

To summarise, early to alcohol may be associated with increased risk of alcohol-related problems. However, the literature is unclear as to whether early alcohol exposure leads to harmful consequences or if early drinking is more likely to occur in children who are at risk due to other personal, familial or social factors. It is possible that different outcomes may result from early alcohol exposure with peers or with parents, although parental drinking practices or attitudes to alcohol may influence higher or lower risk drinking.

Levels of evidence

Of the 20 reviews used in this section, 4 reviews were categorised as 1+ (B); 6 as 2+ (C); 7 as 2-(C) and 3 as level 3 (D). Methodologically one review was of good quality with a low risk of bias and six having a moderate probability that the relationship is causal, the remaining reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.2 Family effects of children's drinking

The majority of reviews concurred with the conclusion that parental alcoholism increases the probability of problem drinking and even chemical dependency in children [61, 66, 85, 86]. In addition, it had been suggested that sibling and grandparental alcoholism also increased the risk of alcoholism in the children [39, 87]. However, recent work has reported mixed findings in this area [31]. Berowitz and Perkins (1986) reported that it was the economic and emotional instabilities associated with alcohol abusing families that hampers the development of a secure and emotionally stable child, which actually influences the development of problematic drinking [88]. Moreover, Deas and Thomas (2002) stated that even if a father was misusing alcohol and other drugs, his presence in the home may protect against substance misuse in the adolescent compared to his absence [87]; a point supported by others [82, 86]. Heath et al. cited in Rutter (2007) found no effect on child outcomes of the duration of presence of an alcoholic parent in the home. Thus whilst there appears to be a general consensus that there is a relationship between parental drinking patterns and their offspring's use of alcohol [63, 68] the underlying mechanism (e.g. genetic, indirect environmental though quality of care or direct through exposure to alcohol use by parents) remains unclear [38]. Further to this, it appears clear that children in disrupted families show increased risk of early substance involvement and abuse / dependence, although the underlying mechanisms remain uncertain [38].

Saltz and Elandt (1986) concluded that if both parents abstain from alcohol the likelihood is their children will be abstainers, whilst if one or more parents drink then their offspring are also more likely to drink [63]. An interesting addition to these findings was the suggestion that male drinking is more closely related to the fathers' drinking habits whilst female patterns are correlated to both parents' alcohol use [51] [63]. Sullivan et al. (2004) reinforced previous findings that early initiation into drinking and growing up with a father who drank heavily were strong predictors of heavy drinking and alcohol-related problems in US college students [78]. A key theme in three further reviews was the centrality of the father-son relationship in influencing alcohol use both negatively and positively [66] [39] [62]. However, other reports

describe the maternal influence as more important than paternal effects [62] [66] [76]. Thus the evidence of differential influence of parents on their sons and daughters is inconclusive.

More general research has concluded that good family relations can impact favourably upon adolescent outcomes, including alcohol use [86, 89], whilst poor and conflictual relations increase the likelihood of alcohol initiation and related problems [39, 88]. Allen et al. (2003) discussed the role of family alcohol use in relation to a condoning effect on adolescent alcohol use and concluded that both parents and peers influence a young person's decisions about substance use [90]. Denton (1994), reported that attempts by parents to express disapproval for their children's alcohol use can be perceived as 'hypocritical morality' by children and therefore ineffective in preventing use [86]. Bosari et al. (2007) found that children of alcohol approving parents experienced more negative consequences of alcohol use compared to parents with more stringent views [62]. Also parents who set clear limits about drinking can reduce the influence of drinking peers [62]. However extremes of control can be dysfunctional for the development of sensible drinking behaviour in teenagers [91]. Foxcroft and Lowe (1991) have suggested the existence of a curvilinear relationship between levels of parental control whereby clear boundaries offered protection to adolescent alcohol misuse while excessively lax or strict parenting increased frequency of misuse [71]. Genetically informed data suggest that 'harsh forms of physical punishment have an environmentally mediated influence on both disruptive behaviour and drug or alcohol misuse'[38]. Interestingly, Vakalhi (2001) argues that young people who are drinking may seek help from an older sibling to act as a bridge between family and peers [92].

In summary, a wide array of parental factors correlate with different aspects of adolescent drinking. However correlation is not the same as causation, and in a familial context other 'common factors' are likely to influence drinking outcomes. There is also conflicting evidence in this area which may be due to methodological limitations of the research [39, 48, 68, 93]. However, it is reasonable to assume that parents can and do influence the drinking behaviour of their children and that there are likely to be problems associated with being either overly lax or restrictive regarding alcohol use.

Levels of evidence

Of the 22 reviews used in this section, 1 review was categorised as 1++ (A); 2 as 1+ (B); 2 as 2++ (B); 5 as 2+ (C); 9 as 2- (C) and 3 as level 3 (D). Methodologically one review was of excellent quality with a very low risk of bias; two had a low risk of bias; two a very little risk of bias; two a moderate probability that the relationship is causal. The remaining 17 reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.3 Peer Groups

Engels (2003) considered the issue of adolescent alcohol use from a developmental perspective, in which young people attempted to seek greater autonomy from parents as they mature which heightens their integration with (and an increased influence of) peer groups [94]. Evidence suggests that increased alcohol use is associated with adolescents spending more time on social activities [95, 96] and there is also a relationship between talking about problems with peers and drinking [76, 97-99]. Thus, alcohol use (although level not defined) can have a positive impact on peer relationships. However this association reported to be stronger in males compared to females and in older young people such as university students [100]. In a review of studies of 16-20 year olds, Brown et al. (2008) state that there may be some constructive aspects in young people's alcohol use with regards to developmental tasks such as 'identity exploration' and bonding with peers [101].

Engels (2003) review found that drinking and pub going by adolescents facilitated the sharing of activities, experiences and emotions with peers and that this engagement with their peer group is associated with healthier emotional functioning while avoiding these activities is associated with lack of social integration, low self-esteem and feelings of depression [94]. However, causality is difficult to ascertain it is not possible to determine if drinking leads to a better social network or if good social networking leads to increased drinking behaviour.

In considering the influence of peers and possible deviant peer affiliation, it is increasingly thought that young people may select like-minded peers to interact with rather than be influenced by peer-pressure. Since behavioural risks cluster, it is thought that genetically predisposed children raised in adverse circumstances and experiencing 'deficits in parenting' have an increase risk of deviant peer affiliation (Heath et al). Schmidt and Hankoff (1979) argue that such social groupings stem from a need to belong because of early familial deprivation [102] and Stacey and Davies (1970) reported strong associations between feelings of alienation, normlessness and powerlessness and favourable attitudes towards the irresponsible use of alcohol among high school students [103].

The majority of work examining the effect of alcohol on friendships has focused on college students. It is likely that alcohol use is important to young people when making the transition from school to college [101, 104, 105]. As university students are often found to drink more than their non student peers, it has been suggested that this context may lead to increased opportunities to socialise and drink heavily [106]. Excessive drinking and drunkenness have often been seen by some as a "right of passage" for college students [107]. Perhaps unsurprisingly alcohol use is viewed as more desirable by college peers than other drug use [63].

In the American literature there is a particular focus on Greek fraternities. Baer (2002) cites a study by Cashin et al. (1988) that reported members of Greek fraternities found alcohol to be a vehicle for friendship more than non fraternity members. More generally students selected friends that drunk in a similar manner to themselves [68].

However, other studies have shown that college students have lost friends through their alcohol consumption [106]. Gill (2002) cites a study by Orford et al. (1974) that reported 8.5% of male students and 3.5% of female students had broken or damaged friendships through drink [106]. In a further cited study by Gill (2002), West el al. (1990) found that 3.2% of males and 0.7% of females admitted losing friends due to drinking [106].

Reviews show that involvement in 'drinking games' by students is consistently associated with higher alcohol consumption [68, 108]. Borsari (2004) explored interpersonal differences between students that played drinking games and those that did not. They found that students engaged in drinking games to facilitate disinhibition, while social anxiety was associated with lower rates of playing and lower levels of drinking in those that played drinking games [108]. Although the level of consumption when engaging in drinking games is of concern, Baer (2002) found that once general alcohol use rates were controlled, game playing did not contribute to alcohol related problems [68].

In summary, friendships and sociability is one area where there is evidence that alcohol use by young people may have some benefits. In both adolescents and students it is likely to play a role in 'bonding' with peers and may lead to greater sociability. However, studies have also shown that alcohol use at certain levels may have detrimental effects on friendship. Further investigation of what levels of consumption these effects occur should be considered.

Levels of evidence

Of the 19 reviews used in this section, 1 review was categorised as a 1+ (B); 1 as 2++ (B); 4 as 2+ (C); 5 as 2- (C); 7 as 3 (D) and 1 as level 4 (D). Methodologically one review had a low risk of bias; one had a very low risk of bias; four a moderate probability that the relationship is causal. The remaining 13 reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal, non-analytical studies or expert opinion.

5.4 Alcohol and other drug use

There has been discussion about the idea that one substance may represent a 'gateway' to other substances [109, 110]. Saltz and Elandt (1986) found that college students who used alcohol were more likely to use cannabis and to hold approving views about its use than their abstaining peers [63]. Boyd, McCabe and Morales (2005) found some evidence that a relationship existed between cocaine use and binge drinking in students from one college [31]. However, Smart and Ogborne (2000) and Golub and Johnson (1998) found no relationship between alcohol use and the use of drugs other than cannabis [111, 112]. To summarise, the link between alcohol and other drug use is not conclusively shown.

Levels of evidence

Of the 6 reviews used in this section, 1 review was categorised as a 1+ (B); 4 as 2- (C) and 1 as level 3 (D). Methodologically one review had a low risk of bias; the remaining reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.5 Sexual risk taking

Alcohol use is correlated with having first sexual experience at a younger age [101, 113]. Leigh et al. (2008) included 13 studies (4 of which looked at adolescents). Results of the meta-analysis showed an association, of borderline significance, between alcohol consumption and non-use of condoms at first time sexual intercourse (this was not found amongst adults). However, they concluded that lifestyle factors such as a propensity for risk taking, sensation-seeking or unconventionality might lead to both alcohol use and unprotected sex in these events. Therefore a link between drinking and unprotected sex in first sexual encounters might be linked to these personality factors rather than a causal effect of alcohol [114].

In a review of substance misuse, including alcohol use, in 11-19 years olds, Kerr and Matlak (1998) reported a link between alcohol use and the likelihood of having sex in adolescents [115]. They also found a link between alcohol use and the likelihood of having unprotected sex although the relationship was not as strong. A third of students who were 12 years or younger at first intoxication reported that alcohol caused them to engage in unplanned sex as apposed to less than 5% of those who reported never having being intoxicated [116].

Clark (2004) reported that adolescent females with alcohol use disorders (AUDs), compared to those without AUDs were more likely to have sexually transmitted infections [51]. Clark also reported that adolescents with AUDs are more likely to become pregnant as teenagers. However aside from one study cited in Clark 2004 [51], and despite anecdotal evidence suggesting a causal link between alcohol and teenage pregnancy, we found no other studies that directly explore this link.

Boyd et al. (2005) also reported that heavy drinking (undefined amount of alcohol) amongst students (aged 18-24) was associated with high risk sexual behaviour and sexual aggression [31]. Thus they speculated about the potential for alcohol to interfere with the development of intimate relationships. In a review of drinking in UK university students Gill (2002) reported a relationship between alcohol and risks such as unplanned pregnancy and HIV infection as well as becoming more sexually involved with someone than they would normally have wanted [106]. Murgraff et al.(1999) cites studies that show that alcohol consumption increases the likelihood of unprotected sex [117]. Cooper (2002) also reported a link between drinking and students decisions to have sex and with forms of risky sex such as having multiple or casual sex partners [118]. Nevertheless, Cooper (2002) concluded that although alcohol use and sexual behaviour covaried this did not mean that alcohol use 'causes' risky sexual behaviours since there may be another unknown factor that links the two [118]. Indeed, a meta-analysis [119] of sexual encounters and their links with alcohol showed that with the exception of first sexual intercourse, the link between alcohol and condom use was weak.

In summary, there are methodological weaknesses in the studies assessing the relationship between alcohol and sexual behaviour and a causal relationship has not clearly been demonstrated [115, 120]. Indeed Fossey et al. (1996) conclude that all that can be concluded from studies of adolescents and sexual behaviour is that some people are more generally inclined to take risks [15, 120]. Nevertheless, the weight of associations while not conclusive suggests that alcohol can contribute to misjudgements about sexual behaviour.

Levels of evidence

Of the 13 reviews used in this section, 1 review was categorised as 1++ (A); 1 as 1+ (B); 2 as 2++ (B); 1 as 2+ (C); 5 as 2- (C) and 3 as level 3 (D). Methodologically one excellent review had a very low risk of bias; three had a very low risk of bias. The remaining reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.6 Academic performance

Loveland-Cherry (2005) reports that school attachment and receiving good grades have been associated with less adolescent alcohol use, while absenteeism and poor grades are associated with early initiation and increased levels of alcohol use [121]. Perkins et al. (2002) found that male students who drank more than 5 drinks, and female students that drank more than 4 drinks, in a session one or two times in a 2 week period were over three times more likely to report getting behind in school work compared with more moderate drinkers [69]. When the drinking frequency increased to 3 times in a 2 week period, they were more than eight times more likely to report this problem [69]. Berkowitz and Perkins (1987) found that women students were as likely as men to experience impaired academic performance due to alcohol [122].

Most reviews which looked at educational performance related to American college students and the majority evidence points to the fact that the association between academic performance and college drinking is inconclusive. A number of reviews have discussed the methodological limitations of studies that investigate the relationship between alcohol and academic performance [78]. Much of the cited evidence for a relationship comes from cross sectional studies which cannot ascribe a causal link. However, there is emerging evidence from longitudinal studies which suggesting binge drinking may impair academic performance over time. Nevertheless, it is noted that most college students who drink go on to lead successful lives [31]. Indeed Gill (2002) argues that alcohol may be a scapegoat for other factors that may limit poor academic performance [106].

In summary, more research evidence is required before the question of whether or not alcohol has a detrimental effect on academic performance can be answered - it is also essential that pattern of drinking be considered [63, 106].

Levels of evidence

Of the 6 reviews used in this section, 1 review was categorised as 2++ (B); 1 as 2+ (C); 3 as 2- (C) and 1 as level 3 (D). Methodologically one review had a very low risk of bias; the remaining reviews was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.7 Offending

It has been found that younger people who drink are more likely to be both perpetrators and victims of violence [2]. Although there is some evidence to show that there is a link between alcohol and violent behaviour in adolescents [123] and weapon carrying [123], it is difficult to ascertain a causal relationship. Giancola (2002) reported that there was modest to good support that expectancies interact with alcohol to increase aggression; it was explained that alcohol can detrimentally affect certain psychological and/or physiological processes that then lead to the expression of aggressive behaviour [124].

Mezler-Lange's (1998) report that alcohol is related to weapon carrying and fighting [123]. It was found that, as well as heavy drinking in the past month, other statistical predictors of carrying a weapon to school were being male, not living with both parents, not feeling close to parents, participating in a fight in the last year, damaging school property and perceiving at least a few other students to have bought weapons to school on the day of the survey were also statistically significant in predicting the student carrying a weapon to school [123]. Women however, were less likely to be involved in offending behaviour than men [122]. Thus, there are clearly factors which will influence weapon carrying other than alcohol. Furthermore, Markowittz (2000) found that while beer and marijuana are linked with a higher likelihood of teenagers engaging in fights, no substances lead to increased probability of carrying a knife, gun or other weapon [125].

In a review of studies examining whether young people charged with alcohol related offences are problem drinkers, Vingilis (1981) concludes that it is not possible to determine whether the drinking of young people charged with alcohol related offences is any greater than that of other young people from the same socio-economic groups [81].

Thunstrom (1988) focused on children up to the age of 16 who were apprehended for drunkenness. This review concluded that the prognosis for a child apprehended for drunkenness is often serious and that the risk for a child that is apprehended for drunkenness of developing alcoholism is about 20% [27]. There is also an increased risk of criminality, future illness and death at an early age, predominantly caused by suicide and violent accidents is also increased [27].

Alcohol related assaults are common on university campuses [31]. Furthermore alcohol consumption also increases the risk of being a victim particularly in heavy drinkers (not defined) [124]. Alcohol is also implicated in many sexual assaults on college campuses [126]. Alcohol use by the victim and / or perpetrator is frequently associated with acquaintance rape. Abbey (1991) found that alcohol use at the time of the attack was one of the four strongest predictors of the likelihood of a college woman's being raped [126]. Dowdall and Wechsler (2002) also indicates that alcohol misuse is strongly associated with the risk of sexual assault [127]. However although alcohol related assaults are common a number of reviewers caution against assuming a simplistic link between the two variables and argue

that there are likely to be multiple ‘pathways’ linking these factors [15, 31, 124, 126]. Giancola (2002) for example states that increasing evidence indicates that ’intoxicated aggression is the product of individual difference and contextual variables interacting with alcohol pharamacodynamics’[124].

Newburn and Shiners (2001) also agree that the relationship between offending and alcohol consumption is complex and that other ‘risk factors are shared’. These are parental substance use, conduct problems in middle childhood and affiliations with ‘delinquent peers’ [2]. This was also found by others [2, 81, 128, 129].

It is likely that intoxication facilitates aggression most in those individuals that are already inclined to aggression [128]. Plant and Plant (2001) state that the effects of alcohol on behaviour depend on ‘an interaction between the drinker and context of drinking as well as chemistry of ethyl alcohol’ [15].

To summarise although there is evidence of a relationship between alcohol use and offending in adolescents and students, a number of reviewers have cautioned against assuming a simplistic relationship and state that it is likely that other risk factors including individual differences and contextual variables will play an important role. However, alcohol may facilitate offending in those who are already predisposed.

Levels of evidence

Of the 13 reviews used in this section, 1 review was categorised as 2+ (C); 8 as 2- (C) and 4 as level 3 (D). Methodologically one review had a moderate risk of bias with the remaining reviews included evidence that was related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal or non-analytical studies.

5.8 Religion

The evidence exploring the effect of religion and alcohol use in young people is mainly restricted to college students based in the USA. The general consensus is that a religious affiliation reduces alcohol consumption in students however there is conflicting evidence as to what degree and which religion provides the greatest protection [63, 68, 88]. It is suggested that depth of religious commitment may be a better predictor of alcohol use than the simple measure of religious involvement [88].

Baer (2002) also found that students who were more religious and more committed to traditional values drink less [68] concluding that a belief that ‘religion was important’ was significantly and independently related to reduced frequency of heavy drinking compared to students with no religious affiliations [68]. Furthermore, Berkowitz (1986) added that more frequent attendance at religious services and greater strength of faith were linked to less problematic drinking in US college students [88].

Levels of evidence

All 3 reviews used in this section were categorised as level 2- (C). Methodologically the reviews in this section were related to case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.

6. Summary of findings and concluding remarks

A distillation of the findings from this review are summarised in Table 3. Within table 3, reference numbers and grade of evidence are shown where appropriate.

The focus of this work was a review of reviews of the harms and benefits of alcohol and young people. It is clear that many of the review in this field are now quite old (around half pre-2000) and a large number were based on data from the USA (around half). The majority of the reviews found related to adolescents and college/university students. Thus they have limited generalisability to contemporary drinking behaviour by young people in the UK. In addition, most of the review work was methodologically weak and so it is not possible to have a high degree of confidence about their conclusions. Future work may need to include a further review of the primary data literature and may perhaps include a review of intervention studies relating to alcohol and young people.

In addition, there was a repeated theme in this body of work in which correlations were reported for a wide range of personal, familial and social factors and alcohol misuse. In addition, alcohol misuse was often correlated with a wide range of health and social consequences. However, it was generally not possible to determine that key risk factors 'caused' alcohol misuse or that the latter specifically led to the adverse effects. Further to this in the main it was not possible to ascertain the levels of alcohol that led to adverse consequences as was the hope of the results of this review of reviews.

Nevertheless, there is a very large body of review work that has accumulated over many years and from this evidence some consistent themes emerged.

It is relatively clear from this literature that both early initiation into drinking and heavy alcohol consumption can lead to a very wide range of adverse consequences for young people's physical and mental health. These adverse effects consisted of both short-term (acute) and longer term health problems. There is a need for more services for young people to be able to deal with the adverse consequences of drinking.

We found few positive effects of drinking on young people's health, with the exception of some social and emotional coping functions of drinking that may help with a sense of positive mental well-being.

There is also a large literature that characterises risk factors that can lead young people to begin drinking earlier in life or to drink large amounts of alcohol. From this body of work, key groups that are particularly vulnerable to alcohol's adverse effects can be characterised. These key groups are young people from socially disadvantaged backgrounds and / or broken homes who begin to drink early and who may have concurrent psychiatric or behavioural disorder problems. Also children of parents with alcohol-related problems may be particularly vulnerable to developing problems with alcohol themselves. One practical indicator of such young people is alcohol presentations at emergency services on week nights (as opposed to the weekend) and parents who show minimal anxiety about the hospital visit.

We also identified some factors that may have a protective effect on children's age of initiation and subsequent use of alcohol. In particular, good family relations and parents with an accurate and well-balanced knowledge about the effects that alcohol on health and well being may help to protect children from the adverse effects of drinking.

However, this field of work is riddled with many interlinked variables related to both risks and consequences of drinking by young people. However, it is difficult to tease these variables apart and establish the actual relationships between them. Thus it is not possible to ascribe a causal link between individuals' personal attributes or life-circumstances and drinking behaviour, or indeed alcohol use and a wide range of activities that may result from drinking (but that may also arise due to other unidentified variable(s). As one author reported, we know that a lot of students drink a lot and we know that a lot of students have unsafe sex; however, what we do not know is whether the two things are directly related.

For obvious ethical reasons, it is not possible to design prospective studies or controlled trials to elucidate the issue of behavioural causality in this field. Thus it is necessary to rely on well-designed longitudinal studies and prospective cross-sectional work that is of sufficient scale to allow multivariate analysis which can control for confounding and interactional factors. However, many of the primary research studies that were cited in the reviews that we have reported were small scale and methodologically weak. Unfortunately, this review of reviews was not able to identify any meta-analyses of the recent large-scale survey work that has occurred in the UK and which has reported multivariate analyses of different dependent variables that may influence (or arise from) drinking behaviour. A key advance in this field would be to establish whether there are primary survey data based on UK populations available and if not to carry out a well-conducted meta-analysis of such areas.

A final remark is that most of the research work on alcohol consumption by young people uses imprecise measures of alcohol use. Thus studies report concepts such as alcohol misuse, abuse, disorders and dependence. We identified no work that reported specific levels of alcohol consumed in terms of standard drink units or blood alcohol counts. Thus from the research to date, it is not possible to link different levels of alcohol consumption to different outcomes. Hence with a view to the formulation of recommendations about alcohol risk reduction for children and young people, it is not easy to conclude that drinking to differing degrees will produce commensurate effects. Thus future research in this field needs to include more precise measurement of alcohol use by young people so that this can be more easily related to specific health or social outcomes and psychometric measures of risk or harm due to drinking in young people.

Table 3: Summary of findings

	Risk factors associated with drinking	Protective factors associated with drinking	Adverse consequences associated with drinking	Positive consequences associated with drinking
Acute and chronic health problems			Adolescents who misuse alcohol are more likely to suffer from side effects including appetite changes, weight loss, eczema, headaches and sleep disturbance [25;B]. The most common impacts of alcohol intoxication are vomiting and coma [25;B]. Young people are not immune to the chronic diseases and conditions associated with excess alcohol consumption and deaths from liver disease are now being seen at an earlier age [4]. Adolescents and young people who drink drive, or allow themselves to be carried by a drink driver are more likely to be involved in a car accident [32;D]. Adolescents and young people who drink alcohol are more likely to sustain an injury, often as a result of an assault [29;C].	
Genetics	There may be a genetic transmission of predisposition to drinking or to predisposition to rapid transition to alcohol abuse [31;C].			
Effect on brain development			Alcohol abuse in adolescence poses a particular danger during a developmentally sensitive period to the emerging faculties of executive function and long term memory served by the prefrontal cortex and hippocampus respectively [25;B]. Adolescents are likely to be more vulnerable than adults to both subtle brain damage and long lasting cognitive deficits following alcohol exposure [25;B]. The maximum a person should drink the night before is determined by the capacity to fully metabolise the dose before school or work [25;B].	Alcohol stimulates the release of endorphins giving a sense of well being [45;C].

	Risk factors associated with drinking	Protective factors associated with drinking	Adverse consequences associated with drinking	Positive consequences associated with drinking
Mental Health	Childhood physical and sexual abuse may be a risk factor for drinking later [59C; 60C]. There is evidence that alcohol misuse and mental disorders aggregate together. An influential interpretation of the association is that it occurs because behaviour disorders and risk taking in general including alcohol misuse share a common genetically influenced 'diathesis' or predisposition that has been referred to as 'psychological dysregulation' [51;C].		There is some evidence that alcohol may increase feelings of depression [47;C]. There is some evidence that stress/anxiety based drinking is associated with long-term and more severe negative outcomes [57;C]. There is a relationship between adolescent alcohol use and mental health problems [49;D]. It is important that all young people with alcohol problems should have a mental health assessment.	
Personality	Sensation seeking and impulsive personality types are associated with drinking in large quantities [64;C] Drinking to cope with stress or anxiety is associated with heavy and binge drinking [57;C].			Some young people may benefit from increased confidence when communicating with members of the opposite sex [63;C]. It might be acceptable to drink to celebrate [65;C].
Age of first drinking	Early exposure with drinking alcohol is associated with increased risk of drinking problematically as an adolescent [84;C].			
Family effects on children's drinking	Alcohol consumption behaviour of parents, grandparents and siblings can have a detrimental influence on the drinking patterns of the offspring [39C; 87C].	The location of a young person's first drink may also be important to future alcohol misuse [81;C].		

	Risk factors associated with drinking	Protective factors associated with drinking	Adverse consequences associated with drinking	Positive consequences associated with drinking
	There may be gender differences in the influence of mothers and fathers on the resulting behaviours of the son or daughter [51;C]. A family history of alcohol problems is likely to increase risk for the young person [61B; 66B; 85C; 86C]. Children with early behaviour problems may be at especially high risk of developing alcohol problems, particularly if there is a family history of alcohol problems [38;B]. Excessive criticism of a young persons drinking may not be protective but harmful [71;B].	Retaining good relationships, characterised by appropriate levels of support and control with a young person is likely to protect them [86C; 89C]. Controlled alcohol use is normal within a developmental process and is not in itself predictive of negative outcomes [62;D].		
Peer groups	Young people should be advised and supported to rely less on alcohol and more on other mechanisms to integrate with peers. Involvement in drinking games could potentially lead to very high alcohol consumption levels [68C; 108C].		Excessive alcohol use could be detrimental to friendships particularly when young people drink quantities above those consumed by others in their peer group [106;B].	Alcohol use at certain levels (undefined) can increase young peoples' sociability [95D; 96D].
Alcohol and drug use link			Young people of college age who use alcohol are more likely to use cannabis than their abstaining peers [63;C]	
Sexual risk taking	A causal relationship between alcohol and risk taking has not clearly been demonstrated. Sexual risk taking and risk taking in general may be manifestations of the same underlying predisposition or personality type. Nevertheless, the weight of		Alcohol consumption is associated with not using a condom on a young person's first sexual encounter [114;B]. Alcohol consumption is associated with increased likelihood of having sex and of having sex at a younger age [101D; 113C; 116D].	

	Risk factors associated with drinking	Protective factors associated with drinking	Adverse consequences associated with drinking	Positive consequences associated with drinking
	associations while not conclusive suggests that alcohol can contribute to misjudgements about sexual behaviour [114;B].		Alcohol consumption may be associated with unprotected sex [116;D]. Alcohol consumption may be associated with teenage pregnancy [51;C]. Alcohol consumption may be associated with the likelihood of catching sexually transmitted diseases [51;C].	
Academic performance			Alcohol consumption could have a detrimental effect on young people's short term educational performance [69;D]. Students are more likely to miss classes because of drinking [121;D].	
Offending	Anti-social behaviour and interpersonal problems in preadolescent children may be predictive of alcohol use disorders [39;C].		Alcohol consumption by young people, particularly by students, is more likely to make them vulnerable to being the victims of crime [124;D]. Alcohol may make some young people more likely to display aggressive behaviour although it is likely that other factors such as personality and family life will play a role [123;D].	
Religion		Religious affiliation, especially religious service attendance, has a protective effect against alcohol consumption [63C; 68C; 88;C].		

Reference number and grade of evidence are shown where appropriate.

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Appendices

Appendix 1: Example search

This search strategy was translated as appropriate to other databases. Exact search strategies are available on request.

ETOH
DE = thesaurus heading
TI = Title word
AB = abstract word
and = AND
/ = OR
#1 DE (AOD use / non-problematic AOD use / problematic AOD use / AOD use behavior / amount of AOD use / AOD consumption / AOD effects and AODR problems / AOD effects and consequences / AODE / physiological AODE / psychobehavioral AODE / acute AODE / chronic AODE / AOD associated consequences / AOD injury / AOD impairment / AOD disability / AOD induced risk / AODR interpersonal and societ al. problems / interpersonal AODR problems / problems for those close to the AOD user / societ al. AODR problems / underage AOD use / underage drinking / AODD / AOD abuse / AOD intoxication / AOD dependence / alcoholic beverage)
#2 DE (young child / preadolescent / adolescent / young adult / underage drinker / student / elementary student / junior high school student / high school student / undergraduate student / graduate student / underage AOD use / underage drinking / offender / juvenile delinquent)
#3 DE (survey of research / meta-analysis / literature review)
#4 #1 / #2 / #3
#5 TI/AB (alcohol consumption / alcohol use / alcohol misuse / alcohol abuse / alcohol intoxicat* / alcohol drinking / alcohol dependence / substance abuse / substance use / substance misuse / binge drinking / social drinking / underage drinking / adolescent drinking / intoxicat* / alcoholism / drunk* / booze / beverage*)
#6 TI/AB (young people / young person* / adolescent* / teenag* / youth* / child* / under-age* / underage* / student* / college* / universit* / school* / delinquent* / offender* / criminal*)
#7 TI/AB (review / meta-analys* / metaanalys* / meta analys*)
#8 #5 / #6 / #7
#9 #4 and #8

Appendix 2: Data extraction form

Review of reviews on alcohol consumption in young people

Reviewer / review details

Reviewer initials:	
Paper author and year:	
Paper title:	

Inclusion / exclusion criteria of the review

Number and type (design) of studies included in this review:	
Main focus of review:	
Risks / harms addressed:	
Benefits addressed:	
Participant age range and / or specified characteristics:	
Setting (if specified): e.g. UK, or school / prison etc	
Outcome(s) assessed: Alcohol only or alcohol with other drugs Any other outcomes	
Data synthesis: Quantitative? (meta analysis or other) Qualitative (meta synthesis or other)? None (narrative summary only)	

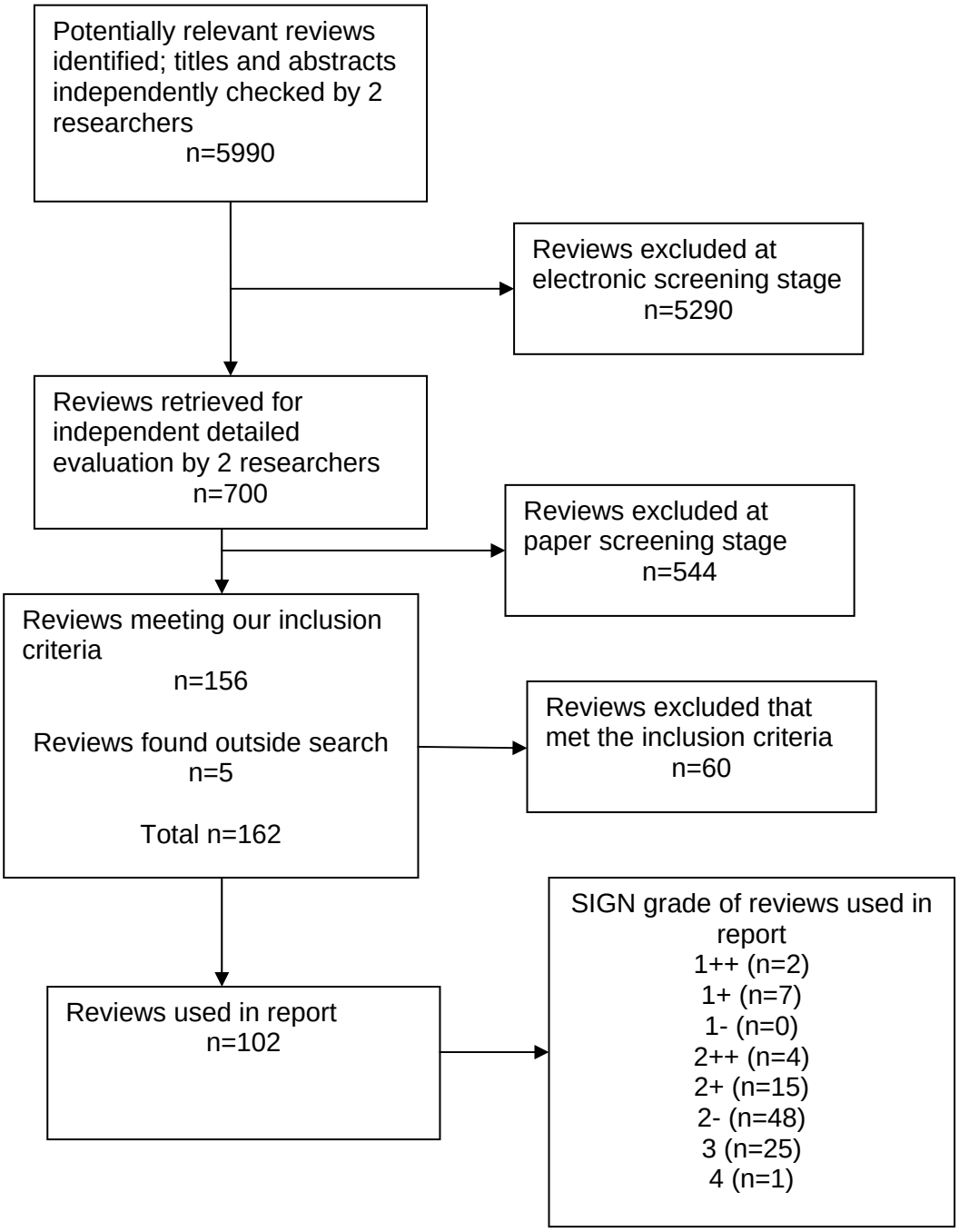
Appendix 3: Quality assessment of review[1]

Tick as appropriate	Yes	No	Unclear	N/A	Comments
Is the question clearly focused in terms of the population and behaviour studied, and outcomes considered?					
Did the reviewers try to identify all the relevant studies? - are databases / resources searched listed? - are the search terms listed? - were reference lists checked? - were unpublished studies sought? - were non-English studies sought? - were experts consulted?					
Is there a clear description of studies? - is the number of included studies explicitly given? - are the characteristics of all included studies individually listed?					
Did the reviewers assess the quality of the included studies? - is there a stated strategy to determine inclusion? - have they listed any excluded studies?					
Does the review have external validity e.g. - did reviewers identify all relevant participants and outcomes to answer the review question? - are the results of the review generalisable to other settings / populations?					
Does the review have internal validity e.g. - has much evidence been found? - are the included studies of good methodological quality (see above) - are the conclusions of the review robust?					
Did the reviewers discuss/ deal with potential biases (e.g. publication bias, clinical heterogeneity)?					

Tick as appropriate	Yes	No	Unclear	N/A	Comments
If there is a meta analysis, has this been carried out appropriately? - is an appropriate summary statistic used? - has an estimate of precision been given (e.g. confidence interval)? - were studies similar enough (is there discussion of heterogeneity)? - is there discussion of potential reasons for variation in results?					
If the results of the studies are qualitatively synthesised, has this been done appropriately?					
Are the review's conclusions justified by the reported data?					
Please report anything else which you think affects the quality of this review.					

[1]Taken from Critical Appraisal Skills Programme (CASP) appraisal tools and QUOROM statement

Appendix 4: Identification of included reviews



Appendix 5: Abbreviations

AAF	Alcohol Attributable Fractions
ADHD	Attention-Deficit Hyperactivity Disorder
AAF	Alcohol Attributable Fractions
AUD	Alcohol Use Disorder
CDSR	Cochrane Database of Systematic Reviews
CIE	Chronic Intermittent alcohol Exposure
COA	Children of Alcoholics
DARE	Database of Abstracts of Reviews of Effectiveness
ESPAD	European School Survey Project on Alcohol and other Drugs
GABA	Gamma Amino Butyric Acid
NIAAA	National Institute on Alcohol Abuse and Alcoholism
NICE	National Institute of Clinical Excellence
NMDA	N-Methyl D-Aspartate
PSUD	Psychoactive Substance Use Disorders
WHO	World Health Organisation

Appendix 6: Details of reviews

Details	Year	Country	Cited	Level of evidence	Grade of evidence
Abbey, A. Acquaintance rape and alcohol consumption on college campuses: How are they linked? Journal of American College Health, 39(4):165-169, 1991	1991	Mainly USA	YES	2-	C
Ahlstrom, S. Family practices and adolescent use of legal and illegal drugs: A review. Nordisk Alkohol- and narkotikatidskrift (Nordic Studies on Alcohol and Drugs), 19:76-82, 2002	2002	Unsure	NO	3	D
Alcohol and the driver: AMA Council on Scientific Affairs. Connecticut Medicine, 50(8):548-554, 1986.	1986	Honk Kong	NO	2-	C
Allen M, Donohue WA, Griffin A, Ryan D, Turner MMM. Comparing the influence of parents and peers on the choice to use drugs - A meta-analytic summary of the literature. Criminal Justice and Behavior 2003; 30(2):163-186.	2003	Unsure	YES	1++	A
Armstrong, T.D.; Costello, E.J. Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity. Journal of Consulting and Clinical Psychology, 70(6):1224-1239, 2002	2002	USA	YES	1+	B
Atkin, C.K. Effects of media alcohol messages on adolescent audiences. Adolescent Medicine, 4(3):527-542, 1993	1993	USA	NO	3	D
Augustyn, M.; Simons-Morton, B.G. Adolescent drinking and driving: Etiology and interpretation. Journal of Drug Education, 25(1):41-59, 1995	1995	Unsure	NO	2-	C
Baer, J.S. Implications for early intervention from a biopsychosocial perspective on addiction. Behaviour Change 1991;8(2):51-59.	1991	USA	YES	2-	C
Baer, J.S. Student factors: Understanding individual variation in college drinking. Journal of Studies on Alcohol (Suppl. 14):40-53 2002	2002	USA	YES	2-	C
Barnes-Grace, M. Development of adolescent drinking behaviour: An evaluative review of the impact of the socialization process within the family. Adolescence, 12(48):571-591, 1977.	1977	USA	NO	2-	C
Beattie-J. Alcohol and the child. Proceedings of the Nutrition Society, 47(2):121-127, 1988.	1988	Unsure	NO	3	D
Belcher, H.M.E.; Shinitzky, H.E. Substance abuse in children: Prediction, protection, and prevention. Archives of Paediatrics and Adolescent Medicine, 152(10):952-960, 1998	1998	USA	YES	2+	C
Berkowitz AD, Perkins HW. Problem drinking among college students: a review of recent research. Journal of American College Health 1986; 35(1):21-8.	1986	USA	YES	2-	C
Berkowitz-A-D; Perkins-H-W. Recent research on gender differences in collegiate alcohol use. Journal of American College Health, 36:123-129, 1987.	1987	USA	YES	2-	C
Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: a meta-analytic integration. Journal of Studies on Alcohol 2003; 64(3):331-41.	2003	Unsure	NO	1+	B
Borsari B, Carey KB. How the quality of peer relationships influences college alcohol use. Drug and Alcohol Review 2006;25(4):361-70.	2006	various incl UK	YES	3	D

Details	Year	Country	Cited	Level of evidence	Grade of evidence
Borsari B, Murphy JG, Barnett NP. Predictors of alcohol use during the first year of college: implications for prevention. Addictive Behaviors 2007; 32(10):2062-86.	2007	USA	YES	3	D
Borsari B. Drinking games in the college environment: a review. Journal of Alcohol and Drug Education 2004; 48(2):29-51.	2004	USA	YES	2-	C
Borsari, B.E.; Carey, K.B. Understanding fraternity drinking: Five recurring themes in the literature, 1980-1998. Journal of American College Health, 48(1):30-37, 1999	1999	various incl UK	YES	2-	C
Boyd CJ, McCabe SE, Morales M. College students' alcohol use: a critical review. Annual Review of Nursing Research 2005; 23:179-211.	2005	USA	YES	2-	C
Braucht GN, Brakarsh D, Follingstad D, Berry KL. Deviant drug use in adolescence: A review of psychosocial correlates. Psychological Bulletin. 1973	1973	Unsure	NO	2-	C
Braucht GN. How environments and persons combine to influence problem drinking: Current research issues. Recent Developments in Alcoholism 1983;1:79-103.	1983	Unsure	NO	2-	C
Brennan-A-F; Walfish-S; AuBuchon-P. Alcohol use and abuse in college students: I. A review of individual and personality correlates. International Journal of the Addictions, 21(4/5):449-474, 1986.	1986	USA	YES	2++	B
Brennan-A-F; Walfish-S; AuBuchon-P. Alcohol use and abuse in college students: II. Social / environmental correlates, methodological issues, and implications for intervention.International Journal of the Addictions, 21(4/5):475-493, 1986.	1986	USA	YES	2++	B
Brown SA, McGue M, Maggs J, Schulenberg J, Hingson R, Swartzwelder S, et al. A developmental perspective on alcohol and youths 16 to 20 years of age. Pediatrics 2008;121 Suppl 4:S290-310.	2008	USA	YES	3	D
Brown SA, Tapert SF. Adolescence and the trajectory of alcohol use: basic to clinical studies. Annals of the New York Academy of Sciences 2004;1021:234-44.	2004	USA	NO	2+	C
Bukstein O, Kaminer Y. The nosology of adolescent substance abuse. American Journal on Addictions 1994;3(1):1-13.	1994	Unsure	YES	3	D
Bukstein, O.G. Disruptive behavior disorders and substance use disorders in adolescents. Journal of Psychoactive Drugs, 32(1):67-79, 2000	2000	Unsure	NO	2-	C
Bukstein, O.G. Influences on the risk of and course of substance use and abuse in adolescents. Current Opinion in Psychiatry, 8(4):218-221, 1995	1995	Finland, USA	YES	2-	C
Burke, R.S.; Stephens, R.S. Social anxiety and drinking in college students: A social cognitive theory analysis. Clinical Psychology Review, 19(5):513-530, 1999	1999	Unsure	YES	2-	C
Clark DB, Thatcher DL, Tapert SF. Alcohol, psychological dysregulation, and adolescent brain development. Alcoholism: Clinical and Experimental Research 2008;32(3):375-85.	2008	Unsure	YES	2-	C
Clark DB. The natural history of adolescent alcohol use disorders. Addiction 2004;99 Suppl 2:5-22.	2004	Unsure	YES	2+	C

Details	Year	Country	Cited	Level of evidence	Grade of evidence
Clark, D.B.; Bukstein, O.; Cornelius, J. Alcohol use disorders in adolescents: Epidemiology, diagnosis, psychosocial interventions, and pharmacological treatment. Pediatric Drugs, 4(8):493-502, 2002	2002	USA	YES	2-	C
Clark, D.B.; Bukstein, O.G. Psychopathology in adolescent alcohol abuse and dependence. Alcohol Health and Research World, 22(2):117-121, 1998	1998	Unsure	YES	2-	C
Clayton RR, Ritter C. The epidemiology of alcohol and drug abuse among adolescents. Advances in Alcohol and Substance Abuse 1985;4(3-4):69-97.	1985	USA	NO	3	D
Coleman L, Cater S. What do we know about young people's use of alcohol? Education and Health 2003; 21(3):50-5.	2003	UK	YES	3	D
Cooper, M.L. Alcohol use and risky sexual behavior among college students and youth: Evaluating the evidence. Journal of Studies on Alcohol (Suppl. 14):101-117, 2002	2002	UK	YES	1+	B
Danielson, C.; Taylor, S.H.; Hartford, M. Examining the complex relationship between Greek life and alcohol: A literature review. NASPA Journal, 38(4):451-465, 2001	2001	Unsure	NO	2-	C
Deas, D.; Thomas, S. Comorbid psychiatric factors contributing to adolescent alcohol and other drug use. Alcohol Research and Health, 26(2):116-121, 2002	2002	Unsure	YES	2-	C
Denton, R.E.; Kampfe, C.M. Relationship between family variables and adolescent substance abuse: A literature review. Adolescence, 29(114):475-495, 1994	1994	Unsure	YES	2-	C
Dielman TE, Butchart AT, Shope JT, Miller M. Environmental correlates of adolescent substance use and misuse: implications for prevention programs. International Journal of the Addictions 1990;25(7A-8A):855-80.	1990	Unsure	NO	2+	C
Donnermeyer JF. The use of alcohol, marijuana, and hard drugs by rural adolescents: A review of recent research. Drugs and Society 1992; 7(1-2):31-75.	1992	USA	YES	2+	C
Donovan JE. Adolescent alcohol initiation: a review of psychosocial risk factors. Journal of Adolescent Health 2004; 35(6):529	2004	Unsure	YES	3	D
Donovan, J.E. Gender differences in alcohol involvement in children and adolescents: A review of the literature. In: J.M. Howard, S.E. Martin, P.D. Mail, M.E. Hilton, and E.D. Taylor, Eds., Women and Alcohol: Issues for Prevention Research, NIAAA Research Monograph No. 32, Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 1996.	1996	Mostly USA	YES	2+	C
Douglass RL. Youth, alcohol, and traffic accidents. Current status. Recent Developments in Alcoholism 1983;1:347-66.	1983	USA	NO	2-	C
Dowdall, G.W.; Wechsler, H. Studying college alcohol use: Widening the lens, sharpening the focus. Journal of Studies on Alcohol (Suppl. 14):14-22, 2002	2002	Mainly USA	YES	3	D
Eigen, L.D. Client-oriented prevention strategies and programs: College students. In: R.H. Coombs and D. Ziedonis, Eds., Handbook on Drug Abuse Prevention: A Comprehensive Strategy to Prevent the Abuse of Alcohol and Other Drugs, Boston, MA: Allyn and Bacon, 1995. 551 p. (pp. 267-297) chapter (02)	1995	Unsure	NO	2-	C

Details	Year	Country	Cited	Level of evidence	Grade of evidence
Engels RCM. Beneficial functions of alcohol use in adolescents: theory and implications for prevention. Nutrition Today 2003;38(1):25-30.	2003	USA, UK, Netherlands	YES	3	D
Engs, R.C.; Hanson, D.J. Gender differences in drinking patterns among college students: A review of the literature. Journal of Alcohol and Drug Education, 35(2):36-47, 1990	1990	USA	YES	3	D
Fillmore, K.M. Epidemiology. In: J.W. Langenbucher, B. S. McCrady, W. Frankenstein, P.E. Nathan, Eds., Annual Review of Addictions Research and Treatment, Vol. 2. New York, Pergamon Press, 1992.	1992	Worldwide	NO	2-	C
Flanagan P, Kokotailo P. Adolescent pregnancy and substance use. Clinics in Perinatology 1999;26(1):185-200.	1999	USA	NO	3	D
Fossey, E.; Loretto, W.; Plant, M. Alcohol and youth. In: L. Harrison, Ed., Alcohol Problems in the Community, London, United Kingdom: Routledge, 1996.	1996	UK	YES	3	D
Foxcroft, D.R.; Lowe, G. Adolescent drinking behavior and family socialization factors: A meta- analysis. Journal of Adolescence, 14:255-273, 1991	1991	UK	YES	1+	B
Galaif ER, Sussman S, Newcomb MD, Locke TF. Suicidality, depression, and alcohol use among adolescents: a review of empirical findings. International Journal of Adolescent Medicine and Health 2007; 19(1):27-35.	2007	Unsure	YES	2-	C
Giancola, P.R. Alcohol-related aggression during the college years: Theories, risk factors and policy implications. Journal of Studies on Alcohol (Suppl.14):129-139, 2002	2002	Mostly clinical	YES	3	D
Gilbert MJ, Alcocer AM. Alcohol use and Hispanic youth: An overview. Journal of Drug Issues 1988;18(1):33-48.	1988	Hispanic	NO	2-	C
Gilbert MJ. Alcohol use among Latino adolescents: What we known and what we need to know. Drugs and Society 1988;3(1-2):35-53.	1988	Latino	NO	2-	C
Gill, J.S. Reported levels of alcohol consumption and binge drinking within the UK undergraduate student population over the last 25 years. Alcohol and Alcoholism, 37(2):109-120, 2002	2002	UK	YES	2++	B
Golub AL, Johnson BD. Alcohol is not the gateway to hard drug abuse. Journal of Drug Issues 1998;28(4):971-984.	1998	USA	YES	2-	C
Goodwin DW. Biological factors in alcohol use and abuse: Implications for recognizing and preventing alcohol problems in adolescence. International Review of Psychiatry. Special Issue: Psychiatry and the addictions 1989;1(1-2):41-49.	1989	Worldwide	NO	2-	C
Grant M. International perspectives on alcoholism and the family: An overview of WHO activities. Saitoh, Satoru; Steinglass, Peter; Schuckit, Marc Alan (1992), 1992: Alcoholism and the family. (pp. 97-116). Tokyo, Japan: Seiwa Shoten; Philadelphia, PA, US: Brunner/Mazel. xii, 310.	1992	Worldwide	NO	3	D
Groves SA, Stanley BH, Sher L. Ethnicity and the relationship between adolescent alcohol use and suicidal behavior. International Journal of Adolescent Medicine and Health 2007;19(1):19-25.	2007	USA	YES	2-	C

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Harford-T-C. Situational factors in drinking: A developmental perspective on drinking contexts. In: P.M. Miller and T.D. Nirenberg, Eds., Prevention of Alcohol Abuse, New York, NY: Plenum Press, 1984.	1984	USA	NO	2-	C
Hastings G, Anderson S, Cooke E, Gordon R. Alcohol marketing and young people's drinking: a review of the research. Journal of Public Health Policy 2005;26(3):296-311.	2005	Unsure	NO	2-	C
Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. Psychological Bulletin 1992; 112(1):64-105.	1992	Unsure	YES	2+	C
Hedges, T.J.; Gerrad, M.; Gibbons, F.X.; Smith, G.E. Psychosocial factors affecting rural adolescent alcohol use. In: R.R. Watson, Ed., Substance Abuse During Pregnancy and Childhood: Drug and Alcohol Abuse Reviews 8, Totowa, NJ: Humana Press, NJ, 1995.	1995	USA	NO	2-	C
Hennecke L, Gitlow SE. Alcohol use and alcoholism in adolescence. New York State Journal of Medicine 1983;83(7):936-940.	1983	USA	YES	2+	C
Hill SY. Neurobiological and clinical markers for a severe form of alcoholism in women. Alcohol Health and Research World 1995;19(3):249-256.	1995	Unsure	NO	2+	C
Hishinuma ES, Nishimura ST, Miyamoto RH, Johnson RC. Alcohol use in Hawaii. Hawaii Medical Journal 2000; 59(8):329-35.	2000	Hawaii	YES	2+	C
Hollstedt C, Olsson O, Rydberg U. The effect of alcohol on the developing organism. Genetical, teratological and physiological aspects. Medical Biology 1977;55(1):1-14.	1977	Unsure	NO	2+	C
Hopfer, C.J.; Crowley, T.J.; Hewitt, J.K. Review of twin and adoption studies of adolescent substance use. Journal of the American Academy of Child and Adolescent Psychiatry, 42(6):710-719, 2003	2003	Unsure	NO	2+	C
Irwin-C-E; Millstein-S-G. Biopsychosocial correlates of risk-taking behaviors during adolescence: Can the physician intervene?. Journal of Adolescent Health Care, 7(6)82s-96s, 1986.	1986	Unsure	YES	3	D
Karam E, Kypri K, Salamoun M. Alcohol use among college students: an international perspective. Current Opinion in Psychiatry 2007; 20(3):213-21.	2007	Worldwide	YES	2-	C
Kelleher KJ, Rickert VI. Rural adolescent alcohol use: An overview. Journal of Rural Health 1991;7(3):293-299.	1991	USA	NO	3	D
Kerr DL, Matlak KA. Alcohol use and sexual risk-taking among adolescents: A review of recent literature. Journal of HIV/AIDS Prevention and Education for Adolescents and Children 1998; 2(2):67-88.	1998	USA	YES	2-	C
Knop J. Nature-nurture interactions in alcoholism: Twin, adoption, and high-risk studies. Nordisk Psykiatrisk Tidsskrift 1989;43(4):285-289.	1989	Worldwide	NO	4	D
Kokotailo, P.K.; Adger, H.Jr. Substance use by adolescents. Clinics in Perinatology, 18(1):125-138, 1991	1991	USA	NO	3	D
Kramer J, Loney J. Childhood hyperactivity and substance abuse: A review of the literature. Advances in Learning and Behavioral Disabilities 1982;1:225-259.	1982	Unsure	YES	2-	C

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Kress Y.Special issues of Adult Children of Alcoholics in Lawson G and Lawson A. 1989. Alcoholism and substance abuse in special populations. Gaithersburg, MD, US: Aspen Publishers	1989	USA	NO	3	D
Kuntsche E, Knibbe R, Gmel G, Engels R. Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. Addictive Behaviors 2006; 31(10):1844-57.	2006	Unsure	YES	2+	C
Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. Clinical Psychology Review 2005; 25(7):841-61.	2005	Unsure	YES	2-	C
Lamminpaa A. Alcohol intoxication in childhood and adolescence. Alcohol and Alcoholism 1995;30(1):5-12.	1995	Unsure	YES	2-	C
Lamminpaa, A. Acute alcohol intoxication among children and adolescents. European Journal of Pediatrics, 153(12):868-872, 1994	1994	Worldwide	NO	2+	C
Lang AR, Stritzke WG. Children and alcohol. Recent Developments in Alcoholism 1993;11:73-85.	1993	Unsure	YES	2-	C
Langeland W, Hartgers C. Child sexual and physical abuse and alcoholism: a review. Journal of Studies on Alcohol 1998; 59(3):336-48.	1998	Unsure	YES	2-	C
Lee EE. Female adolescent drinking behavior: potential hazards. Journal of School Health 1978;48(3):151-6.	1978	USA	NO	3	D
Leigh B, Vanslyke J, Hoppe M, Rainey D, Morrison D, Gillmore M. Drinking and Condom use: Results from an Event-Based Daily Diary. AIDS and Behaviour. 2008;12(1):104-12.	2008	USA	YES	2++	B
Leigh B. Alcohol and Condom Use: A Meta-Analyis of Event-Level Studies Sexually Transmitted Diseases. 2002 29(8):476-82.	2002	Various not UK	YES	1++	A
Leigh, B.C.; Morrison, D.M. Alcohol consumption and sexual risk-taking in adolescents. Alcohol Health and Research World, 15(1):58-63, 1991	1991	USA	YES	2-	C
Lennings CJ, Kenny DT, Howard J, Arcuri A, Mackdacy L. The relationship between substance abuse and delinquency in female adolescents in Australia. Psychiatry, Psychology and Law 2007;14(1):100-110.	2007	Australia	NO	3	D
Leonard KE, Eiden RD. Marital and family processes in the context of alcohol use and alcohol disorders. Annual Review of Clinical Psychology 2007;3:285-310.	2007	Unsure	NO	2-	C
Leukefeld, C.G.; Logan, T.K.; Clayton, R.R.; Martin, C.; Zimmerman, R.; Cattarello, A.; Milich, R.; Lynam, D. Adolescent drug use, delinquency, and other behaviors. In: T.P. Gullotta, G.R. Adams, R. Montemayor, Eds., Delinquent Violent Youth: Theory and Interventions, Thousand Oaks, CA: Sage, 1998. 320 p.	1998	USA	NO	2-	C
Lie N. Follow-ups of children with attention-deficit hyperactivity disorder. Acta Psychiatrica Scandinavica 1992; 85:5-40.	1992	USA	YES	2-	C
Lieberman DZ. Children of alcoholics: an update. Current Opinion in Pediatrics 2000;12(4):336-40.	2000	USA	YES	2-	C
Loveland-Cherry CJ. Alcohol, children, and adolescents. Annual Review of Nursing Research 2005;23:135-77.	2005	Unsure	YES	3	D

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Lowe, G.; Foxcroft, D.R. Young people, drinking and family life. Alcologia: European Journal of Alcohol Studies, 5(3):205-209, 1993	1993	Unsure	YES	2-	C
Maggs J, Schulenberg, JE. Initiation and course of alcohol consumption among adolescents and young adults. In: Editor GM, ed. *Recent developments in alcoholism: Alcohol problems in adolescents and young adults*. New York: Kluwer Academic/Plenum Publishers 2005.	2005	Unsure	YES	1+	B
Makhija NJ. Childhood abuse and adolescent suicidality: a direct link and an indirect link through alcohol and substance misuse. International Journal of Adolescent Medicine and Health 2007;19(1):45-51.	2007	USA	YES	2-	C
Markowitz, S. Role of alcohol and drug consumption in determining physical fights and weapon carrying by teenagers. Cambridge, MA: National Bureau of Economic Research, 2000. 36 p. report, program plan (04)	2000	USA	YES	2-	C
May, C. Control policies and youthful alcohol misuse: Effecting normative change? Addiction Research, 1(2):89-96, 1993	1993	North Europe, North America, Australasia	YES	3	D
Melzer-Lange, M.D. Violence and associated high-risk health behavior in adolescents: Substance abuse, sexually transmitted diseases, and pregnancy of adolescents. Pediatric Clinics of North America, 45(2):307-317, 1998	1998	USA	YES	3	D
Morrison SF, Rogers PD, Thomas MH. Alcohol and adolescents. Pediatric Clinics of North America 1995;42(2):371-87.	1995	USA	NO	3	D
Murgraff, V.; Parrott, A.; Bennett, P. Risky single-occasion drinking amongst young people - Definition, correlates, policy, and intervention: A broad overview of research findings. Alcohol and Alcoholism, 34(1):3-14, 1999	1999	Unsure	YES	2-	C
Nace EP. Epidemiology of alcoholism and prospects for treatment. Annual Review of Medicine 1984;35:293-309.	1984	USA	NO	3	D
Nace-E-P. Epidemiology of alcoholism. Pediatrician, 14(1/2):2-6, 1987.	1987	Various not UK	NO	2-	C
Newburn T and Shiner M. Teenage Kicks? Young people and alcohol: a review of the literature. York Joseph Rowntree Foundation; 2001	2001	UK	YES	3	D
Pandina RJ. Methods, problems, and trends in studies of adolescent drinking practices. Annals of Behavioral Medicine 1986;8(2-3):20-26.	1986	USA	NO	3	D
Patton LH. Adolescent substance abuse: Risk factors and protective factors. Pediatric Clinics of North America 1995;42(2):283-293.	1995	Worldwide	YES	2-	C

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Perkins, H.W. Surveying the damages: A review of research on consequences of alcohol misuse in college populations. Journal of Studies on Alcohol (Suppl. 14):91-100, 2002	2002	USA	YES	3	D
Plant M, Plant M. Focus. Young people and alcohol. NT Research 2001;6(6):887-97.	2001	Europe including UK	YES	2-	C
Prendergast, M.L. Substance use and abuse among college students: A review of recent literature. Journal of American College Health, 43(3):99-113, 1994	1994	USA and Canada	YES	3	D
Presley, C.A.; Meilman, P.W.; Leichliter, J.S. College factors that influence drinking. Journal of Studies on Alcohol (Suppl. 14):82-90, 2002	2002	USA	YES	2+	C
Pullen L. Psychological and demographic variables and their relationship to alcohol abuse in college students: a literature review. Addictions Nursing Network 1993;5(1):17-22.	1993	USA	YES	3	D
Rogers PD, Harris J, Jarmuskewicz J. Alcohol and adolescence. Pediatric Clinics of North America 1987;34(2):289-303.	1987	USA	YES	2+	C
Rosa, M.D.L.; Vega, R.; Radisch, M.A. Role of acculturation in the substance abuse behavior of African-American and Latino adolescents: Advances, issues, and recommendations. Journal of Psychoactive Drugs, 32(1):33-42, 2000	2000	African American and Latino	NO	3	D
Rose, R.J. Developmental behavior-genetic perspective on alcoholism risk. Alcohol Health and Research World, 22(2):131-143, 1998	1998	8 countries - not UK	YES	2-	C
Rutter M/ Proceeding from observed correlation to causal inference. The use of natural experiments. Perspectives on Pyschological Science. 2(4) 377-395. 2007	2007	Unsure	YES	1+	B
Saltz-R; Elandt-D. College student drinking studies 1976-1985. Contemporary Drug Problems, 13(1):117-159, 1986.	1986	USA	YES	2-	C
Saunders, B.; Baily, S. Alcohol and young people: Minimizing the harm. Drug and Alcohol Review, 12(1):81-90, 1993	1993	UK, USA	YES	3	D
Schmidt MT, Hankoff LD. Adolescent alcohol abuse and its prevention. Public Health Reviews 1979;8(2):107-153.	1979	USA, France and Austria	YES	2+	C
Schor, E.L. Adolescent alcohol use: Social determinants and the case for early family-centered prevention. Family-focused prevention of adolescent drinking. Bulletin of the New York Academy of Medicine, 73(2):335-356, 1996	1996	Unsure	NO	2-	C
Schulenberg, J.E.; Maggs J.L. Developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. Journal of Studies on Alcohol (Suppl. 14):54-70, 2002	2002	USA	NO	2-	C
Schwenk TL. Alcohol use in adolescents: The scope of the problem and strategies for intervention. Physician and Sportsmedicine 2000;28(6):71-76.	2000	USA	NO	3	D

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Schydlower, M.; Anglin, T.M.; Fuller, P.G., Jr.; Heyman, R.B.; Jacobs, E.A.; Shah, R.Z.; Tenenbein, M. Alcohol use and abuse: A paediatric concern. Paediatrics, 95(3):439-442, 1995	1995	USA	YES	4	D
Segal B. Drugs and youth: a review of the problem. International Journal of the Addictions 1983;18(3):429-33.	1983	USA	NO	4	D
Settertobulte, W.; Jensen, B.B.; Hurrelmann, K. Drinking among young Europeans. Copenhagen, Denmark: WHO Regional Office for Europe, 2001. 46 p. report, program plan (04)	2001	Europe including UK	YES	3	D
Sharp DJ, Lowe G. Adolescents and alcohol--a review of the recent British research. Journal of Adolescence 1989;12(3):295-307.	1989	Britain	YES	2+	C
Sher L, Sperling D, Zalsman G, Vardi G, Merrick J. Alcohol and suicidal behavior in adolescents. Minerva Pediatrica 2006;58(4):333-9.	2006	USA	NO	3	D
Sher L, Zalsman G. Alcohol and adolescent suicide. International Journal of Adolescent Medicine and Health 2005;17(3):197-203.	2005	USA	NO	3	D
Sindelar HA, Barnett NP, Spirito A. Adolescent alcohol use and injury. A summary and critical review of the literature. Minerva Pediatrica 2004; 56(3):291-309.	2004	Worldwide	YES	2-	C
Smart RG, Murray GF. A review of trends in alcohol and cannabis use among young people. Bulletin on Narcotics 1981;33(4):77-90.	1981	Various not UK	NO	3	D
Smart, R.G.; Ogborne, A. Drinking and heavy drinking by students in 18 countries. Drug and Alcohol Dependence, 60(3):315-318, 2000	2000	18 countries	NO	3	D
Smart, R.G.; Ogborne, A.C. Drug use and drinking among students in 36 countries. Addictive Behaviors, 25(3):455-460, 2000	2000	36 countries	YES	2-	C
Spear, L.P. Adolescent brain and the college drinker: Biological basis of propensity to use and misuse alcohol. Journal of Studies on Alcohol (Suppl. 14):71-81, 2002	2002	USA	YES	2-	C
Stacey, B; Davies, J. Drinking behaviour in childhood and adolescence: An Evaluative Review. British Journal of Addiction 65, pp 203-212. 1970	1970	Worldwide	YES	3	D
Strasburger, VC, Wilson. Children, Adolescents and the Media, Thousand Oaks, CA, Sage 2002	2002	Unsure	NO	3	D
Sullivan M, Wodarski J. Rating College Students' Substance Abuse: A Systematic Literature Review. Brief Treatment and Crisis Intervention 2004; 4(1):71-91.	2004	USA	YES	2+	C
Swaim RC. Childhood risk factors and adolescent drug and alcohol abuse. Educational Psychology Review 1991;3(4):363-398.	1991	Worldwide	YES	2+	C
Thompson-K-M; Wilsnack-R-W Drinking and drinking problems among female adolescents: Patterns and influences. Alcohol Problems in Women: Antecedents, Consequences, and Intervention, New York, NY: Guilford Press, 1984.	1984	Unsure	YES	2-	C

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Thunstrom M. The alcohol intoxicated child and its prognosis. Acta Paediatrica Scandinavica 1988;77(1):3-9.	1988	Mainly Sweden	YES	2-	C
Vakalahi, H.F. Adolescent substance use and family-based risk and protective factors: Literature review. Journal of Drug Education, 31(1):1-28, 2001	2001	Unsure	YES	2-	C
Vicary, J.R.; Karshin, C.M. College alcohol abuse: A review of the problems, issues, and prevention approaches. Journal of Primary Prevention, 22(3):299-331, 2002	2002	USA	YES	3	D
Vingilis-E. Literature review of the young drinking offender: Is he a problem drinker? British Journal of Addiction, 76(1):27-46, 1981.	1981	Canada	YES	2-	C
Weinberg, N.Z.; Rahdert, E.; Colliver, J.D.; Glantz, M.D. Adolescent substance abuse: A review of the past 10 years. Journal of the American Academy of Child and Adolescent Psychiatry, 37(3):252-261, 1998	1998	USA	NO	2-	C
Weiss, S. Review of drinking patterns of rural Arab and Jewish youth in the North of Israel. Substance Use and Misuse, 37(5-7):663-686, 2002	2002	Israel	NO	3	D
Welte J, Barnes, GM. Alcohol: The gateway to other drug use among secondary-school students. Journal of Youth and Adolescence. 1985;14(6):487-98.	1985	USA	YES	3	D
White AM, Swartzwelder HS. Age-Related Effects of Alcohol on Memory and Memory-Related Brain Function in Adolescents and Adults. Galanter, Marc (2005), 2005: Recent developments in alcoholism: Volume 17. Alcohol problems in adolescents and young adults. Epidemiology neurobiology prevention treatment. (pp. 161-176). New York, NY, US: Kluwer Academic/Plenum Publishers. xxi, 456.	2005	Unsure	YES	2-	C
White HR. Longitudinal perspective on alcohol use and aggression during adolescence. Recent Developments in Alcoholism 1997;13:81-103.	1997	USA	YES	2+	C
Wilcox JA. Adolescent alcoholism. Journal of Psychoactive Drugs 1985;17(2):77-85.	1985	USA	NO	2+	C
Wilens, T.E.; Biederman, J. Psychopathology in preadolescent children at high risk for substance abuse: A review. Harvard Review of Psychiatry, 1(4):207-218, 1994	1994	USA/ Sweden & others	YES	2-	C
Williams, J.D. Minority adolescents, alcohol consumption, and media effects: A review of issues and research. In: R.M. Lerner, Ed. Early Adolescence: Perspectives on Research, Policy, and Intervention, Hillsdale, NJ: Lawrence Erlbaum Associates, 1993.	1993	USA	NO	3	D
Windle M, Spear LP, Fuligni AJ, Angold A, Brown JD, Pine D, et al. Transitions into underage and problem drinking: developmental processes and mechanisms between 10 and 15 years of age. Pediatrics 2008;121 Suppl 4:S273-89.	2008	Unsure	YES	2-	C
Windle M, Windle, RC. Alcohol consumption and its consequences among adolescents and young adults. In: Editor GM, ed. *Recent developments in alcoholism: Alcohol problems in adolescents and young adults*. New York: Kluwer Academic/Plenum Publishers 2005.	2005	USA	YES	3	D

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Windle, M.; Tubman, J.G. Children of alcoholics. In: W.K. Silverman and T.H. Ollendick, Eds., Developmental Issues in the Clinical Treatment of Children, Boston, MA: Allyn and Bacon, 1999.	1999	Unsure	NO	2+	C
Witt ED. Puberty, hormones, and sex differences in alcohol abuse and dependence. Neurotoxicology and Teratology 2007;29(1):81-95.	2007	Unsure	NO	2+	C
Woodside M. Children of alcoholic parents: Inherited and psycho-social influences. Journal of Psychiatric Treatment and Evaluation 1983;5(6):531-537.	1983	Unsure	NO	4	D
York, J.L. Clinical significance of alcohol intake parameters at initiation of drinking. Alcohol, 19(1): 97-99, 1999	1999	USA	YES	2-	C
Yu J, Willford, WR. The age of alcohol onset and alcohol, cigarette and marijuana use patterns: An analysis of drug use progression of young adults in New York State. The International Journal of the Addictions. 1992;27(11):1313-23.	1992	USA	YES	1+	B
Zeigler DW, Wang CC, Yoast RA, Dickinson BD, McCaffree MA, Robinowitz CB, et al. The neurocognitive effects of alcohol on adolescents and college students. Preventive Medicine 2005;40(1):23-32.	2005	Unsure	YES	1+	B
Zucker RA, Donovan JE, Masten AS, Mattson ME, Moss HB. Early developmental processes and the continuity of risk for underage drinking and problem drinking. Pediatrics 2008;121 Suppl 4:S252-72.	2008	USA	YES	2-	C
Zucker RA, Noll RB. The interaction of child and environment in the early development of drug involvement: A far ranging review and a planned very early intervention. Drugs and Society 1987;2(1):57-97.	1987	Unsure	NO	2-	C
Zuckerman, M. Is sensation seeking a predisposing trait for alcoholism?. In: E. Gottheil, K.A. Druly, S. Pashko, and S.P. Weinstein, Eds., Stress and Addiction, New York: Brunner/Mazel, 1987.	1987	Unsure	NO	2-	C

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