GUIDANCE ON THE CONSUMPTION OF ALCOHOL BY CHILDREN AND YOUNG PEOPLE: SUPPLEMENTARY REPORT

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Table 1: Effects of alcohol consumption on development

Study ID	Methods	Participants	Results
Block et al, 1993	The study examined the effects of alcohol use on pubertal development. Luteinising hormone (LH), follicle stimulating hormone (FSH) and testosterone were assayed in urine.	250 adolescents (25 males and 90 male controls; 21 females and 114 female controls).	Serum LH and FSH were increased, while urinary FSH and LH were decreased in alcohol-abusing males ($p<0.01$). Serum oestrogen levels were decreased in alcohol abusing females ($p<0.01$).
Brown et al, 2000	The study examined associations between alcohol involvement in early to middle adolescence and neuropsychological functioning. Tests and psychosocial measures were administered to alcohol-dependent participants following 3 weeks of detoxification.	33 alcohol-dependent adolescents with over 100 lifetime alcohol episodes compared to 24 adolescents who had no histories of alcohol or drug problems and were matched on age (15-16 years), gender, socioeconomic status, education, and family history of alcohol dependence.	Alcohol-dependent and comparison adolescents demonstrated significant differences on several neuropsychological scores. Protracted alcohol use was associated with poorer performance on verbal and nonverbal retention in the context of intact learning and recognition discriminability. Recent alcohol withdrawal among adolescents was associated with poor visuospatial functioning, whereas lifetime alcohol withdrawal was associated with poorer retrieval of verbal and nonverbal information.

Study ID	Methods	Participants	Results
Clark et al, 2001	The study compared adolescents with alcohol use disorders and a community reference group on self-reported health problems, serum liver enzymes, and physical examination findings. The relevance of negative emotionality to understanding these health problems was also investigated. The assessment of health status included self-reported health problems in 15 areas: serum liver enzyme assays, including gamma-glutamyl transpeptidase, alanine aminotransferase, and aspartate aminotransferase; and physical examination findings.	Adolescents with alcohol use disorders recruited from clinical programs and classified as having DSM-IV alcohol dependence (n=71) or alcohol abuse (n=57) and 131 reference adolescents without alcohol use disorders recruited from community sources.	Adolescent alcohol use disorders were associated with more self-reported health problems, higher gamma-glutamyl transpeptidase and alanine aminotransferase levels, and more physical examination abnormalities. Negative emotionality was highly correlated with self-reported health problems, mediated the relationship between alcohol use disorders and self-reported health problems, and was not correlated with serum liver enzyme levels or physical examination abnormalities.
Crews et al, 2000	The study examined the effects of a 4 day binge ethanol treatment (e.g. 4 days of 4 times per day 15% ethanol intragastrically, approximately 9-10 g/kg/day ethanol) were investigated in adolescent-juvenile rats, 35 days old and compared with adult rats, 80 to 90 days old. Brain damage was measured by using the amino cupric silver stain of de Olmos et al (1994).	Adolescent-juvenile rats 35 days old compared with adult rats 80 to 90 days old.	The young-adolescent brain showed differential sensitivity to alcohol-induced brain damage compared with adults. The olfactory bulbs were equally damaged in both groups; however, the associated frontal cortical olfactory regions were damaged only in adolescent-juvenile rats. The anterior portions of the piriform and perirhinal cortices also were damaged only in adolescent-juvenile rats.

Study ID	Methods	Participants	Results
De Bellis et al, 2000	This study compared the hippocampal volumes of adolescents and young adults with adolescent-onset alcohol use disorders to those of healthy matched comparison participants.	12 participants with alcohol use disorders and 24 comparison participants matched on age, sex, and handedness.	Both left and right hippocampal volumes were significantly smaller in participants with alcohol use disorders than in comparison participants. Total hippocampal volume correlated positively with the age at onset and negatively with the duration of the alcohol use disorder. Intracranial, cerebral, and cortical grey and white matter volumes and measures of the mid-sagittal area of the corpus callosum did not differ between groups.
De Bellis et al, 2005	The authors compared prefrontal-thalamic-cerebellar measures of adolescents and young adults with adolescent-onset alcohol use disorders (defined as DSM-IV alcohol dependence or abuse) with those of sociodemographically similar control participants.	14 participants (8 males, 6 females) with an alcohol use disorder (mean age 17.0 years) and 28 controls (16 males, 12 females; mean age 16.9 years).	Subjects with alcohol use disorders had smaller prefrontal cortex and prefrontal cortex white matter volumes compared with control subjects. Right, left, and total thalamic, pons/brainstem, right and left cerebellar hemispheric, total cerebellar, and cerebellar vermis volumes did not differ between groups.
De Bellis et al, 2008	The authors hypothesised that participants with adolescent onset alcohol use disorders (AUDs, defined as DSM-IV alcohol dependence or abuse) would have myelination microstructural differences compared to controls.	25 males and 7 females with an AUD (mean 16.9 years), were recruited from substance abuse treatment programs and had co-morbid mental disorders, and 28 healthy controls (17 males, 11 females; mean 15.9 years).	Measures of rostral body fractional anisotropy (FA) were higher in the AUD group than in the control group. Compared to controls, mean diffusivity (MD) was lower, while FA was higher, in the AUD group in the isthmus region. Anterior corpus callosum microstructural development differed in adolescents with AUD, as age was positively (not negatively) associated with rostrum MD and age was negatively (not positively) associated with rostrum FA. The authors concluded that these findings suggest pre-morbid vulnerability for accelerated prefrontal and temporo-parietal myelin maturation that may enhance the risk for adolescent AUD.

Study ID	Methods	Participants	Results
Elgán et al, 2002	The objective of the study was to investigate bone mineral density and bone turnover among female students aged 16-24 years in relation to lifestyle factors, such as dietary habits and physical activity, as well as physiological factors, such as age, body weight, and menstrual pattern.	Female college and university students (n = 218; aged 16-24 years).	There were no significant correlations between bone mineral density and height, current calcium intake, alcohol or tobacco consumption.
Fehily et al, 1992	14 year follow-up of children who took part in randomised controlled trial of the effect of a milk supplement on child growth.	581 children aged 7-9 at baseline. Participants were followed up at age 20-23 years.	Inverse relationship between alcohol consumption and bone mineral density in men.
Frias et al, 2000a	The authors studied the effects of acute alcohol intoxication on the pituitary-gonadal axis hormones, and the possible contribution of pituitary-adrenal axis hormones, beta-endorphin, and prolactin to the alcohol-induced dysfunction of pituitary-gonadal axis hormones.	27 adolescents (11 males and 16 females) aged from 13-17 years with acute alcohol intoxication and 21 controls (10 males and 11 females).	The study demonstrated that acute alcohol intoxication in young people of both sexes produces profound changes in testosterone, beta-endorphin, prolactin and pituitary-adrenal axis hormones. Adrenocorticotropic hormone and prolactin could increase adrenal androgens in females while beta-endorphin could decrease testicular testosterone in males.
Frias et al, 2000b	The authors studied the effects of acute alcohol intoxication on the growth axis hormones, and the possible contribution of the insulin-glucose axis to the alcohol-induced dysfunction of the growth axis in human adolescents.	30 adolescents (14 males and 16 females) with acute alcohol intoxication aged 13-17 years and 21 controls.	Acute alcohol intoxication resulted in a decrease in growth hormone levels, without significant alteration of either insulin-like growth factor-I or insulin-like growth factor binding protein-3; and an increase in plasma glucose and a decrease in insulin in the female adolescents but not in the males.

Study ID	Methods	Participants	Results
Fujita et al, 1999	The authors investigated the correlation between bone mineral density and physical constitution, vitamin D receptor (VDR) genotype, age, age of menarche, history of menstrual dysfunction, and exercise.	157 young Japanese women (20-37 years).	Neither smoking nor drinking alcohol had a significant influence on the level of bone mineral density.
Neville et al, 2002	The aim of this study was to determine the extent to which different components of physical activity may influence bone mineral status within a representative population sample of young men and women.	242 men and 212 women aged 20-25 years.	Alcohol intake reported by women had a significant negative relationship with lumbar spine bone mineral content, with the opposite effect being seen in men for femoral neck bone mineral content and bone mineral density.
Strauss et al, 2000	The aim of the study was to determine the prevalence of abnormal liver enzymes in overweight and obese adolescents and to determine the relationship of alcohol ingestion and serum antioxidants to the presence of abnormal liver enzymes in overweight and obese adolescents. Serum alanine aminotransferase (ALT) and gamma-glutamyl transpeptidase levels were measured.	2,450 children between the ages of 12-18 years, enrolled in the National Health and Examination Survey.	Approximately 50% of obese adolescents who reported modest alcohol ingestion (4 times per month or more) had elevated ALT levels (OR 10.8; 95% CI: 1.5, 77).

Table 2: Risk and protective factors

Study ID	Methods	Participants	Results
Aas et al, 1998	The authors used structural modelling techniques to investigate the relative influence of expectancy and drinking in a three wave study of Norwegian adolescents.	924 seventh grade students (11-12 years).	Among students who were already drinkers upon entry into the study, expectations of positive social effects of alcohol predicted drinking longitudinally. Among those who began drinking during the study, these social expectancies predicted drinking initiation, but drinking also influenced subsequent expectancy in the early stages of drinking.
Andrews et al, 1993	The study examined both substance-use specific and non-specific, or generalised, effects of parent substance use, attitudes towards use, and behaviour regarding use on adolescent initiation and maintenance of alcohol, cigarettes and cannabis use.	645 adolescents (11-15 years) and their parents.	Early adolescents who initiate the use of a particular substance tend to have mothers who use substances more frequently, have fathers with a positive attitude toward the use of that specific substance, have parents who tend to less frequently caution the adolescent about substance use, and have mothers who give more negative consequences following the use of other substances than do adolescents who continue to be non-users.
Bellis et al, 2007	Examined economic, behavioural and demographic factors that predict risky drinking behaviours.	Cross-sectional survey of 10,271 schoolchildren aged 15-16 years.	Binge, frequent and public drinking were strongly related to expendable income and to individuals buying their own alcohol. Obtaining alcohol from friends, older siblings and adults outside shops were also predictors of risky drinking. However, being bought alcohol by parents was associated with both lower bingeing and drinking in public places. Membership of youth groups/teams was in general protective despite some association with bingeing.

Study ID	Methods	Participants	Results
Caspi et al, 1997	The present study examined whether age 3 temperament can predict age 21 health-risk behaviour and whether age 18 personality mediates this longitudinal association.	Base sample of 1,037 (52% male and 48% female) for the longitudinal study.	Adolescents who at age 18 were characterised by low scores on Traditionalism, Harm Avoidance, Control, and Social Closeness, and by high scores on Alienation and Aggression were significantly more likely to be involved in health-risk behaviour at age 21, including unsafe sex, dangerous driving habits, participation in violent crime, and alcohol abuse.
Colder & Chassin, 1997	The current study assessed joint effects of impulsivity, positive affectivity, and negative affectivity on adolescent alcohol use and alcohol-related impairment.		Impulsivity was found to moderate the effects of positive affectivity on both alcohol use and alcohol-related impairment. Impulsive adolescents who were also characterised by low levels of positive affectivity evidenced higher levels of alcohol use and experienced more alcohol-related impairment than did impulsive adolescents with high positive affectivity or nonimpulsive adolescents.
Costa et al, 1999	The aim of the study was to establish the role of psychosocial risk and protective factors in cross-sectional variation in adolescent problem drinking, and in the transition into problem drinking over time.	Four wave longitudinal study of 1,591 adolescents in Grades 7, 8 and 9 at wave 1.	Both psychosocial risk factors (such as low expectations for success, peer models for substance use, and poor school performance) and psychosocial protective factors (such as intolerance of deviance, peer models for conventional behaviour, and involvement in prosocial activities) accounted for significant cross-sectional variation in adolescents' involvement in problem drinking. Protective factors played an independent role in accounting for adolescent involvement in problem drinking and in the transition into problem drinking in adolescence.

Study ID	Methods	Participants	Results
Darling et al, 2006	The study examined self-reported sources of income and expenditure, and the association between part-time employment and spending on fast food, alcohol, cigarettes, and gambling.	3,434 New Zealand secondary school students (mean age 15 years).	Disposable income was usually received from parents and guardians, but nearly 40% of students also reported receiving money from part-time employment. The proportion of students employed increased as socioeconomic rating increased, and was associated with increased purchasing of fast food and alcohol, and increased spending on cigarettes and gambling.
Donovan, 2004	Longitudinal research studies that focused on alcohol use initiation in adolescence were reviewed to determine which variables function as antecedent predictors or risk factors.	Articles included in this review were identified through searches of electronic databases (PsycINFO and Medline) as well as by combing the reference lists of published articles in the literature.	The likelihood of adolescent alcohol initiation is greater if parents drink or use illicit drugs, if adolescents do not have a close relationship with their parents, if adolescents affiliate with deviant or drinking peers, if adolescents have tolerant attitudes toward deviance or approve of alcohol and drug use, if they are depressed or anxious, if they already engage in other problem behaviours like delinquent behaviour or smoking, and if they have less involvement in the conventional institution of school.
Ellickson et al, 2001	Longitudinal study that investigated Grade 7 and Grade 10 risk factors for alcohol misuse at Grade 12.	4,203 adolescents who completed Grade 7, 10 and 12 assessments.	Grade 7 predictors of alcohol misuse 5 years later included early drinking onset, parental drinking, future intentions to drink, cigarette offers, difficulty resisting pressures to smoke, being white, being male, having an older sibling, deviant behaviour and poor grades. By Grade 10, predictors of alcohol misuse 2 years later included drinking and cannabis use by self and peers, future intentions to drink, difficulty resisting pressures to drink and use cannabis, being male, coming from a disrupted family and deviant behaviour.
Flewelling et al, 1990	Longitudinal survey to assess the relationship between family structure (intact, single-parent, or step-parent) and whether cigarettes, alcohol, marijuana, and sexual intercourse had ever been tried.	2,102 adolescent aged 12-14 years.	Logistic regression results show significantly higher levels of ever-usage for children of non-intact families. These differences are not diminished when age, race, sex, and mother's education are controlled.

Study ID	Methods	Participants	Results
Foley et al, 2004	Compared adults' approval of adolescents' alcohol use among white, black, and Latino youth and to evaluate the effects of approval on most recent alcohol consumption, past 30-day use and binge drinking.	Cross-sectional telephone survey of 6,245 adolescents from 242 communities.	Perceived consequences, parent and adult relative provision of alcohol, and drinking with a parent were protective of underage drinking. Providing alcohol at a party, however, was associated with a two-fold increase in past 30-day use and binge drinking.
Gabel et al, 1999	The study examined whether relationships exist between personality dimensions, antisocial behaviour, and alcohol or other substance misuse (AOSM) in adolescents and in their fathers and mothers, who often also have histories of AOSM.	100 male adolescents (mean age 15.8 years) entering a residential treatment centre for youths with AOSM, their mothers, their fathers, and 100 community controls.	Novelty seeking (NS), one of the personality dimensions, was significantly correlated with substance misuse in adolescent with AOSM, adolescent controls, and fathers and mothers of adolescents with AOSM, but not in control fathers and mothers. Regression analyses that included conduct disorder or antisocial personality disorder symptoms indicated that both novelty seeking, and conduct disorder or antisocial personality disorder, symptoms made significant contributions to the prediction of substance misuse in treatment group participants and in their fathers and mothers.
Hayes et al, 2004	The report aimed to review and synthesise the research and interventions concerning the impact of parenting factors on adolescent alcohol use.	Relevant research concerning parenting influences on adolescent alcohol use was identified by searching the biomedical and social sciences databases for primary research material.	To summarise the research reviewed, a conceptual model of parenting influences on adolescent alcohol use was developed. This model suggested that parental monitoring, parental norms for adolescent use, and parental behaviour management skills all have direct links to adolescent alcohol use. Parent–adolescent relationship quality has an overall effect on these parenting behaviours, as well as direct connections to alcohol use. Parental characteristics have an indirect effect on alcohol use, by way of their influence on the parenting behaviours described above. The parental characteristics depicted as having an indirect effect include parental alcohol use or abuse, as well as family factors, and broader cultural norms regarding alcohol use.

Study ID	Methods	Participants	Results
Kuntsche et al, 2005	Reviewed evidence of adolescent and young adult drinking motives and their relation to possible consequences over the last 15 years.	A computer-assisted literature search was conducted of Current Contents, ERIC, ETOH, Medline, PsycINFO, Sociological Abstracts, and SwetsNet.	Most young people reported drinking for social motives, some indicated enhancement motives and only a few reported coping motives. Concerning potential outcomes, social motives appear to be associated with moderate alcohol use, enhancement with heavy drinking and coping motives with alcohol-related problems.
Lanza & Collins, 2002	The goal of the study was to examine in detail the relationship between pubertal timing and substance use onset using a sample of females from The National Longitudinal Study of Adolescent Health.	966 females who were in 7th grade at Wave 1 and 8th grade at Wave 2.	Early developers were significantly more likely to initiate substance use between 7th and 8th grade (47% for early developers vs. 22% for on-time and late developers). In addition, early developers were more likely to advance in substance use in general, regardless of their level of use at Grade 7.
Soloff et al, 2000	The authors studied older adolescents, both male and female, to examine the relationships between sex, dispositional impulsivity, aggressivity, CD, and responsiveness to serotonergic challenge with d,l-fenfluramine (FEN) early in the development of alcohol use disorders (AUD).	36 adolescents between the ages of 16 and 21 years.	Eighteen adolescents (12 male, 6 female) with AUD scored significantly higher on all measures of impulsivity and aggressivity compared with 18 healthy controls (12 male, 6 female). The group did not demonstrate the diminished prolactin or cortisol responses to FEN characteristic of adult alcoholics with impulsive-aggression.
Van Der Vorst et al, 2006	The study explored the role of having rules about alcohol, parental norms about early alcohol use, and parental alcohol use in the development of adolescents' drinking behaviour.	428 families with at least two children aged 13-16 years.	The findings indicated that the more conservative the norms about early alcohol use, the less that adolescents drank. Paternal and maternal alcohol use was not directly related to adolescents' alcohol use.

Study ID	Methods	Participants	Results
Van Der Vorst et al, 2007	The aim of the study was to examine the bi-directional relationships between providing alcohol specific rules and adolescents' alcohol consumption. In addition, the authors assessed whether each trait of the Big Five personality model moderated the association between alcohol-specific rules and adolescents' alcohol consumption.	428 families with at least two children aged 13-16 years.	In cross-sectional analyses, providing alcohol-specific rules was negatively related to alcohol consumption among both older and younger adolescents who were already drinking and who still were in the initiation phase of drinking. In addition, providing alcohol-specific rules prevented older and younger adolescents from starting to consume alcohol. The Big Five personality traits did not moderate the association between providing alcohol-specific rules and adolescents' alcohol involvement.
Van Reek et al, 1994	The authors conducted a survey of adolescent drinking in 12 European countries.	9,312 participants.	Explanatory variables related to weekly drinking included drinking among friends, drinking by parents, alcohol permissiveness by parents, pocket money, weekly smoking, and disco visits.

Table 3: Effects of age of onset of drinking

Study ID	Methods	Participants	Results
Agrawal et al, 2006	Based on data from the Missouri Adolescent Female Twin Study (MOAFTS), the authors investigated whether use and early-onset use of cigarettes, alcohol and cannabis contributed an increase in risk for initiation of subsequent psychoactive substances in women. In users only, initiation age of cigarettes (never, later onset, early onset prior to 12 years), alcohol (never, later onset, early onset prior to 14 years) and cannabis (never, later onset, early onset prior to 16 years) was used to code early-onset drug use.	3,729 young adult female twins who participated in baseline and/or 5-year follow-up interviews.	Early alcohol use (<16 years) was associated with early cigarette use. Early cannabis and other drug use were associated with alcohol use prior to age 14 years. Early onset of multiple illicit substances resulted in a sharp incline in the probability of experimentation with subsequent drug classes.

Study ID	Methods	Participants	Results
Dawson et al, 2007	The aim of the study was to examine the impact of age at first drink on the association between stress and drinking. Age at first drink was ascertained by asking respondents how old they were when they first started drinking, not counting small sips and tastes of alcohol. Respondents were asked whether they had experienced 12 different types of stressful life events in the past 12 months (e.g. death of a family member or close friend, change in living situation). Volume of alcohol consumption in the past 12 months was based on data summed across separate series of questions by type of drink.	Based on data from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). Analysis based on a subsample of 26,946 past year drinkers (mean age 42.7 years).	Compared with individuals who started drinking at age 18 or above, those who started drinking at age 14 or younger experienced significantly more stressors and drank more than 3 times the volume of alcohol. Increasing stress levels were associated with a greater increase in consumption among individuals who started drinking at ages 14 and younger than among those who started drinking at older ages; however, the association between stress and volume of consumption was significant only for early initiators. The absolute percentage increase in average daily volume with each additional stressor was 7% among individuals who initiated drinking at ages 14 and younger, and it was not statistically significant among those who started drinking at older ages. The differential stress-related increase in average daily volume among persons who started drinking at 14 or younger was 7 percentage points (p=0.018); however, it was nonsignificant (p=0.679) for individuals who initiated drinking at ages 15 to 17.

Study ID	Methods	Participants	Results
Dawson et al, 2008	The authors examined associations between age at first drink and first incidence of DSM-IV alcohol dependence, abuse and specific alcohol use disorder criteria over 3 years. Age of first drink was determined by asking respondents how old they were when they first started drinking, not counting small tastes and sips. Age of first drink was categorised as: <15, 15-17 and ≥18 years. Incidence of alcohol use disorders in the sample was determined using the Alcohol Use Disorder and Associated Disabilities Interview Schedule. Multivariate logistic regression models assess the odds of incidence alcohol use disorders and alcohol use disorders criteria among individuals at risk, comparing age at first drink: <15 years and 15 to 17 years with ≥18 years.	The data used in the analysis came from two waves of the NESARC. The analysis was based on a subsample of respondents who had consumed at least 1 drink between follow-up and who reported their age of first drink (n=22,316).	After controlling for all significant risk factors, respondents who started drinking at ages younger than 15 were at increased risk of the incidence of alcohol dependence (OR 1.38; 95% CI: 1.00, 1.90) and alcohol abuse (OR 1.52; 95% CI: 1.05, 2.21). Among those who started drinking at ages 15 to 17, there was an increased adult incidence of alcohol abuse for both men and women (OR 1.30; 95% CI: 1.07, 1.59), but an increased incidence of dependence was limited to women (OR 1.54; 95% CI: 1.12, 2.11 for women vs. OR 0.97; 95% CI: 0.75, 1.25 for men). In terms of dependence criteria, age of first drink <15 years vs. 18+ was associated with withdrawal (OR 1.54; 95% CI: 1.11, 2.15) and drinking more/longer than intended (OR 1.31; 95% CI: 1.01, 1.69). Age of first drink <18 was significantly associated with time spent drinking (OR 1.34) and continued drinking despite adverse physical/psychological effects (OR 1.27). Analysis of a subsample of 'low-risk drinkers' (did not report any family history of substance abuse or mental disorder and negative for all personality disorders and childhood risk factors), revealed a strong association between age of first drink before the age of 18 and the incidence of alcohol dependence (OR 3.79; p=0.001) but not abuse (OR 1.11; p=0.835), relative to initiation of drinking at 18 years or older.

Study ID	Methods	Participants	Results
DeWit et al, 2000	The study had two main objectives: (i) describe the natural course of DSM-III-R alcohol disorders in the general population for different categories of age at first use of alcohol; and (ii) investigate the influence of age at first use on the risk of progressing to disorders, holding potential confounding factors constant. Information on alcohol use and alcohol disorders was obtained by using a modified version of the World Health Organization's Composite International Diagnostic Interview. The authors used the Kaplan-Meier survivorship function to estimate the probability of not developing an alcohol disorder for each year in the sample for which there was at least one case of alcohol disorder.	Data were obtained from the 1990-1991 Ontario Mental Health Supplement, a stratified, multistage, area probability sample of the Ontario household population aged 15 and over. The study was based on a sample of 5,856 lifetime drinkers with an estimated median age at first drink of alcohol of 15.24 years.	Participants who started to drink between the ages of 11 and 14 were at the greatest risk of developing alcohol abuse. Ten years after their first drink 13.5% of the respondents ages 11 and 12 and 13.7% of the respondents ages 13 and 14 had progressed to a diagnosis of alcohol abuse, compared to just 2.0% in the reference group (19 and older). The authors found that vulnerability to the risk of abuse was highest for adolescents who started drinking between the age 11-14, followed by those who started drinking before the age of 11 and participants who had their first drink at age 15 or 16. The highest risk profile for developing lifetime alcohol dependence occurred for participants who had their first drink at age 11 or 12. Ten years after their first drink, 15.9% of the respondents who began drinking at age 11 or 12 qualified for a diagnosis of lifetime alcohol dependence compared to 1.0% of those ages 19 and older. The risk of developing dependence for those who started to drink at ages 15-18 was not significant (relative to the reference group).

Study ID	Methods	Participants	Results
Dooley et al, 2005	The authors explored early alcohol drinking onset and the mechanisms by which it leads to later alcohol disorder. Respondents who reported ever having a drink were asked three questions regarding their alcohol drinking onset. Respondents were assigned to four categories of alcohol disorder: alcohol dependent, alcohol abusing, drinking but not disordered, and non-drinking in the past month. The authors examined four types of possible mediators between early alcohol drinking onset and later alcohol abuse or dependence: family context, educational/ occupational performance, psychological wellbeing, and prior history of alcohol disorder. Multinomial logistic regression was used to evaluate the predictors of alcohol drinking onset and in the mediation analysis.	Based on data from the National Longitudinal Survey of Youth (NLSY). Assessment of the predictors of early alcohol drinking onset was based on 8,165 respondents. Analyses of the mediators of the relationship between early alcohol drinking onset and later alcohol misuse was based on data from 5,643 respondents.	The odds of early alcohol drinking onset decreased with increasing aptitude and more frequent religious attendance. Odds were increased for respondents who were ever charged with an illegal act. Respondents who reported living with both their mother and father when they were 14 years old were less likely to report alcohol drinking onset at ages 13-15 years. A family history of alcoholism was significantly associated with early drinking. Compared to those who first started drinking at 16 years or older, the odds of later alcohol abuse and dependence were higher for those who first began drinking at 12 years or younger (OR 1.71 and OR 1.66, respectively; both $p<0.05$) and for those who began drinking at ages 13-15 years (OR 1.61 and OR 1.89, respectively; both $p<0.01$). Respondents who began drinking at 12 years or younger were more likely to report abstinence in adulthood than respondents who began drinking between the ages of 13 and 15 years.

Study ID	Methods	Participants	Results
Ellickson et al, 2003	The objective of the study was to compare early nondrinkers, experimenters and drinkers on the prevalence of problem behaviours at grades 7 and 12 and at age 23. 'Nondrinkers' were classified as participants who had never had a drink, not even a few sips. 'Experimenters' were students who reported drinking <3 times in the past year and not in the past month and 'drinkers' were students who reported drinking 3 or more times in the past year or who reported drinking in the past month. Problem behaviours included school problems (e.g. skipping school, being sent out of class), substance use, and crime (e.g. stealing from a store, carrying a weapon).	Data came from a longitudinal survey of 6,527 students assessed at grade 7, grade 12 and at age 23. At grade 7, 23% (n=1,487) of participants were classified as nondrinkers, 46% (n=2,884) as experimenters, and 31% (n=1,967) as drinkers.	Compared with nondrinkers, early drinkers at grade 7 were: 19 times more likely to engage in weekly smoking and any hard drug use; 14 times more likely to engage in weekly marijuana use; 4.5 times more likely to steal; 3 times more likely to be sent out of class or skip class; 2 times more likely to be frequently absent from school; 1.5 times more likely to have poor grades. Compared with nondrinkers, adolescent drinkers by grade 7 had the following characteristics at grade 12: 4 times more likely to be daily smokers, 3 to 5 times more likely to be illicit drug users and have multiple drug problems, 2.5 times more likely to be weekly or binge drinkers, be alcohol abusers, and have multiple alcohol problems, 1.3 to 2 times more likely to have school problems, 2 to 3.5 times more likely to steal, commit a felony, and sell drugs, 1.3 to 1.8 times more likely to engage in violence, 1.5 to 2 times more likely to experience early parenthood and pregnancy. Compared with nondrinkers, young adults who were classified as drinkers by grade 7 were: 4 to 5 times more likely to be weekly marijuana users and show signs of drug abuse, 2 to 3 times more likely to engage in hard and polydrug use, have multiple drug problems, and have received any drug or alcohol treatment since age 18, 2.7 times more likely to be daily smokers, 1.7 to 2.3 times more likely to be weekly or binge drinkers, show signs of alcohol dependence, and have multiple alcohol problems, about 1.5 times more likely to report missing work for no good reason, 4.5 times more likely to sell drugs, 2 to 3 times more likely to be arrested, and 2 times more likely to steal, commit a felony, or engage in predatory violence.

Study ID	Methods	Participants	Results
Fergusson et al, 1994	The study examined the relationship between age at first exposure to alcohol and four measures of drinking behaviour (frequency of drinking, typical and most amount consumed, alcohol-related problems) at age 15 years. At ages 11, 12, and 13 years children were asked to report the age at which they recalled first drinking alcohol, and whether they had drunk alcohol in the last year. Reported age of first alcohol consumption was classified as follows: (i) 0-5 years; (ii) 6-10 years; (iii) 11-12 years; and (iv) after 13 years. At age 15, children were asked about their alcohol consumption in the last year in relation to frequency of consumption during the last 3 months, the amount of alcohol consumed on a typical occasion, the largest amount of alcohol consumed in the last 3 months, and problems associated with the consumption of alcohol based on Rutgers Alcohol Problem Index.	Data came from the Christchurch Health and Development Study. Original cohort included 1,265 children.	Children who had been introduced to alcohol before the age of 6 years had the highest frequency of drinking, the highest mean consumption levels and the highest rate of reported problems. Children introduced to alcohol after age of 13 years had the lowest mean scores on all these measures. Children who were introduced to alcohol at an early age had parents who tended to report more frequent drinking when the child was aged 11 years, parents who were less disapproving of alcohol consumption and parents who displayed favourable attitudes to alcohol. Adjusted for covariate factors, the results presented suggest that young people who were exposed to alcohol before the age of 6 years had between 1.9 to 2.4 times the risk of frequent, heavy or problem drinking when compared with young people not introduced to alcohol by the age of 13 years.

Study ID	Methods	Participants	Results
Grant & Dawson, 1997	The aim of the study was to examine the relationship between age of onset of alcohol use and the prevalence of alcohol abuse and dependence in late adolescence and adulthood. Based on direct face-to-face interviews participants meeting DSM-IV criteria were diagnosed based on AUDADIS. Age of drinking onset was ascertained by asking participants how old they were when they first started drinking (not counting small tastes and sips of alcohol). Demographic and alcohol-related items that have been shown to affect the risk of alcohol abuse and dependence were selected as control variables for multivariate analyses.	Study based on the National Longitudinal Alcohol Epidemiologic Survey (NLAES). Respondents were 18 years of age. Sample restricted to 27,616 participants who were current or former drinkers (66% of original sample).	Prevalence of lifetime alcohol dependence decreased steeply as a function of increasing age at onset of drinking. The prevalence of alcohol dependence was >40% in those who initiated drinking before 15 years, and 38.7% and 30.6%, respectively, among those who started drinking at ages 15 and 16. The prevalence of lifetime alcohol abuse peaked among participants who had began drinking at age 14 years. The odds of lifetime alcohol dependence were reduced by 14% with each increasing year of age at first use and the odds of lifetime alcohol abuse were reduced by 8%.

Study ID	Methods	Participants	Results
Grant et al, 2001	The aim of the study was to examine the relationship between age at drinking onset and the development of DSM-IV alcohol abuse and dependence in a 12-year prospective study of youth in the USA. To ascertain the age of onset of drinking, respondents were asked how old they were when they first started drinking (more than two drinks a week). A diagnosis of alcohol abuse required respondents to meet at least 1 of 3 abuse criteria measures, and a diagnosis of alcohol dependence required respondents to meet at least 3 of 7 abuse criteria measures. The authors controlled for the effects of demographic factors and problem indicators (e.g. family history of alcoholism) in the analyses.	Data from National Longitudinal Survey of Labour Market Experience in Youth (NLSY), an annual survey of 12,686 participants (aged 14-21 in 1979). Study based on data from 5,789 respondents. Respondents who were abstainers and frequent light drinkers, or who failed to provide complete data were excluded.	Based on outcomes measured in 1989 (7 years later), the odds of alcohol dependence decreased by 5% with each increasing year of age at drinking onset, however the odds of alcohol abuse were not significantly related to age of drinking onset. Using outcome variables of alcohol abuse and dependence measured in 1994 (12 years later), age of drinking onset was significantly related to abuse and dependence. The odds of alcohol dependence increased by 9% with each increasing year of age at drinking onset, and the odds of abuse decreased by 7%.

Study ID	Methods	Participants	Results
Gruber et al, 1996	The objective of the study was to examine the relationship between age of drinking onset and patterns of use, abuse of other substances and the prevalence of other alcohol-related problems. Age of drinking onset was ascertained with one item, 'If you have used alcohol, how old were you when you started?' Other measures included: frequency of alcohol use (never, over a year ago, less than monthly, about monthly, about weekly, daily); and volume of consumption ('If you drink beer/wine/hard liquor, generally, how much do you drink at one time?'). An alcohol abuse scale (AAS) was constructed by multiplying the typical quantity of alcohol consumed on a single occasion by the monthly frequency of drinking and adding the frequency of intoxication. Sequelae and problems resulting from alcohol and/or drug use were also assessed. Multivariate logistic regression was used to assess the contribution of age of onset to current (12th grade) patterns of alcohol use controlling for the effects of gender and current age.	Data from Minnesota Student Survey (MSS). Study restricted to 2,650 white 12th graders.	Mean age at onset of alcohol use was 14.4 years, and average duration of use was 3.3 years (range 0-9 years). 15% of the sample were classified as early initiators ($\leq$12 years at onset of alcohol use). As seniors, male early initiators drank more frequently, drank greater quantities, and got drunk more often than later initiators, as well as being more likely to score on the upper 25% of the AAS. Early-initiating females consumed more and drank with greater frequency than later initiators, got drunk more frequently, were more likely to experience blackouts, become violent, miss school or work, damage relationships, and combine drinking and driving than late initiators. Like early-initiating males, they were also more likely to score in the upper tertile of the AAS. Multivariate logistic regression: students who initiated drinking from ages 10 through 12 were 2.7 times more likely than later initiators (age 13 or older) to score in the upper tertile on the AAS when accounting for age and current gender (OR 2.7; 95% CI 0.21, 3.4).

Study ID	Methods	Participants	Results
Hawkins et al, 1997	The aim of the study was to examine whether the age of initiation of alcohol use mediated the effects of other variables that predict alcohol misuse among adolescents. The measurement of alcohol misuse was developed from three scales (Drink and Drive scale, Heavy Drinking scale and the Alcohol Problems scale). Age of drinking initiation was based on three measures of the age at which the student began drinking. Structural equation modelling was used to examine hypotheses for the prediction of alcohol misuse.	Participants in the study were 808 fifth grade students (age 10-11) who participated in the Seattle Social Development Project. Students were assessed at recruitment in the autumn of fifth grade (age 10-11), in the spring of the fifth-grade year (1986), and annually thereafter in the spring of the year through to 1991, and again in the spring of 1993.	Age of initiation was a strong predictor of alcohol misuse at age 17-18; that is students who began drinking early misused alcohol more at age 17-18. The results also showed that age of initiation of alcohol use mediated the effects of ethnicity, parents' drinking, proactive parenting, school bonding, friends' alcohol initiation, and perceived harmfulness of alcohol.

Study ID	Methods	Participants	Results
Hingson et al, 2000	The aim of the study was to explore whether early age of drinking onset was related to respondents drinking heavily, placing themselves in situations that increased their risk of injury, and having experienced an unintentional injury after drinking. Measures of alcohol use and dependence were derived from the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS). Age of drinking onset was ascertained by asking respondents who consumed at least 12 drinks in any year of their life how old they were when they first started drinking (not counting small sips or tastes of alcohol). Age of drinking onset was categorised as <14 years, 14, 15, 16, 17, 18, 19, 20 and ≥21 years. Current heavy drinking was determined by asking respondents how often they had drunk five or more drinks in a single day during the past 12 months. Taking risks that might lead to injury was assessed by asking respondents about incidents while drinking or after drinking in the past 12 months, or during their lifetime. The authors adjusted for background characteristics including history of alcohol dependence, through a series of multiple logistic regression analyses.	Study based on data from the National Longitudinal Alcohol Epidemiologic Survey (NLAES). Respondents were 18 years of age and older and black and young adults (18-29 years) were oversampled.	Respondents who began drinking <14 years old were nearly 1.4 times likely to report consuming ≥5 drinks on a single occasion at least once per week during the past year [OR 1.44 (95% CI 1.10, 1.88)], and 2.8 times more likely to report drinking enough to be intoxicated once a week [OR 2.79 (95% CI 1.75, 4.45)]. Also, they were 2.8 times more likely to report drinking ≥5 drinks at least once a week during their period of heaviest drinking [OR 2.76 (OR 2.13, 3.58)]. Respondents who began drinking <14 years old relative to those who began ≥21 years, were 4.8 times* (3 times**) more likely to have ever been in a situation after drinking that increased their risk of injury [OR 4.82 (95% CI 3.96, 5.89) / OR 3.04 (95% CI 2.47, 3.74)] and 2.4 times* (1.5 times**) more likely to have done so in the past year [OR 2.38 (95% CI 1.52, 3.71) / OR 1.52 (95% CI 0.95, 2.43)]. They were also 4.9 times* (3 times**) more likely to have ever been injured while under the influence of alcohol [OR 4.99 (95% CI 3.91, 6.36) / OR 2.98 (95% CI 2.29, 3.89)] and 3.2 times* (2 times**) more likely for this to have occurred in the past year [OR 3.19 (95% CI 1.77, 5.78) / OR 1.96 (95% CI 1.03, 2.56)]. After controlling for measures of current alcohol dependence and past year frequency of drinking 5 or more drinks or to intoxication, respondents who began drinking before the age of 18 years were significantly more likely than those starting at ≥21 years to place themselves in situations after drinking in the past year that increased their risk of injury. *Adjusted for personal, social, and demographic characteristics associated with age of drinking onset. **Adjusted for above and measures of alcohol dependence and heavy drinking. (ORs relative to those who started drinking at ≥21 years)

Study ID	Methods	Participants	Results
Hingson et al, 2001	The objective of the study was to explore whether people who start drinking at an early age are more likely to have been in physical fights after drinking, independent of respondent history of alcohol dependence and heavy drinking. The primary outcome measure was whether respondents had ever been in a fight after drinking. This was measured by asking respondents whether they had been in a physical fight during or after drinking alcohol, and whether it had happened in the past 12 months. See above for measures of alcohol dependence, heavy drinking and age of onset. The authors controlled for background characteristics including history of alcohol dependence, through a series of multiple logistic regression analyses.	Study based on data from the National Longitudinal Alcohol Epidemiologic Survey (NLAES).	After controlling for ever being alcohol dependent, years of drinking alcohol, age, gender, race/ethnicity current and previous illicit drug use and smoking, and family history of alcoholism, respondents who began drinking <14 years were 4.7 (95% CI: 3.6, 6.1) times more likely than those who began after age 21 to report ever being in a fight after drinking. After further controlling for frequency of drinking 5+ during their period of heaviest drinking, those who started drinking before age 14 were 4.1 (95% CI: 3.2, 5.4) times more likely to have ever been in a fight after drinking. In each individual age group examined, those who started drinking before age 21 were significantly more likely than those who started at age 21 or older to have been in a physical fight after drinking. After controlling for personal history of alcohol dependence, frequency of drinking 5+ or to intoxication in the past year, years of drinking alcohol, and other characteristics related to the age of drinking onset, respondents who started drinking at $\leq$16 years were at least 3 times as likely to report being in a fight in the past year while or immediately after drinking (95% CI not reported).

Study ID	Methods	Participants	Results
Hingson et al, 2002	The aim of the study was to assess whether people who began drinking at younger ages were more likely to report drunk driving and alcohol-related crash involvement over their life course. Respondents were asked whether they had ever driven a vehicle after having too much to drink, and whether this had happened in the past 12 months. Alcohol-related crash involvement was ascertained by asking respondents whether they had ever had an accident in a vehicle because of their drinking, and whether this had happened in the past 12 months. The following demographic and behaviour variables were examined as potential confounders of the association between age of drinking onset and later behaviour: current age, sex, race/ethnicity, education, marital status, smoking status, illicit drug use status, years of drinking alcohol, and alcohol dependency.	Study based on data from the National Longitudinal Alcohol Epidemiologic Survey (NLAES).	Respondents who began drinking when they were age 14 were 2.8 (95% CI 2.2, 3.6) times more likely than those who began after age 21 to report ever driving after drinking too much and 2.5 (1.7, 3.6) times more likely to do so in the year prior to the survey. Further, they were 3.5 times more likely to report being in a motor-vehicle crash after drinking too much ever (95% CI 2.4, 5.1) and 5.1 times more likely to report being in an alcohol-related crash in the past year (95% CI 1.7, 15.6).

Study ID	Methods	Participants	Results
Hingson et al, 2003	The study explored whether college students who were first intoxicated by alcohol at ages <19 years were more likely to become alcohol dependent and frequent heavy drinkers, drive after drinking, ride with intoxicated drivers and be injured after drinking. The study was based on data from the 1999 Harvard College Alcohol Survey. Respondents were asked how old they were when they first got drunk. Heavy episodic drinking was defined as the consumption of at least 5 drinks in a row for men and four drinks in a row for women on an occasion in the previous 2 weeks. Diagnosis of alcohol dependence based on DSM-IV criteria required that in any 1 year a respondent must meet at least three of seven criteria.	119 schools (14,138 students).	After controlling for personal and demographic characteristics, the odds of meeting alcohol dependence criteria were significantly greater for those who were first drunk ≤12 years compared with drinkers who were first drunk at age 19 or older (OR 3.1; 95% CI not reported). In addition, respondents who were first drunk ≤12 years had greater odds of reporting recent heavy episodic drinking than those who were first drunk after age 19 (OR 2.1; 95% CI not reported). Compared with students who were first drunk at age 19 or older, those who began drinking to intoxication in each age group less than 19 were significantly more likely to be seriously injured within 6 hours of drinking (≤12 years: OR 2.6; 95% CI: 1.0, 6.8), drive after drinking (≤12 years: OR 1.6; 95% CI: 1.2, 2.2), drive after five or more drinks (≤12 years: OR 2.0; 95% CI: 1.4, 3.1) and ride with a driver who was high or drunk (≤12 years: OR 1.8; 95% CI: 1.3, 2.5). However, after controlling for whether respondents drove after 5+ drinks, and whether they rode with a driver who was high or drunk, only those who were first intoxicated at ages 13-15 were still more likely than those first intoxicated at 19 years or older to be seriously injured after drinking (OR 2.5; 95% CI: 1.2, 5.3).

Study ID	Methods	Participants	Results
Hingson et al, 2006	The objective of the study was to examine whether starting to drink at an early age is associated with developing alcohol dependence at a younger age and chronic relapsing dependence. Lifetime and past-year alcohol dependence were defined by 7 diagnostic criteria: tolerance; the withdrawal syndrome or drinking to relieve or avoid withdrawal symptoms; drinking larger amounts or for a longer period than intended; persistent desire or unsuccessful attempts to cut down on drinking; spending a great deal of time obtaining alcohol, drinking, or recovering from effects of drinking; giving up important social, occupational, or recreational activities in favour of drinking; and continued drinking despite physical or psychological problems caused by drinking. Respondents were asked the age at which they first started drinking, not counting tastes or sips, which was categorised as younger than 14 years, separately for each year from 14 through 20 years old, and 21 years and older.	Study based on data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). Nationwide face-to-face survey with a multistage probability sample of 43,093 adults aged 18 or older.	Relative to those who waited until age 21 years or older, those who started drinking before age 14 years had elevated hazards of developing lifetime dependence (1.78; 95% CI, 1.51, 2.11), dependence within 10 years of drinking onset (1.69; 95% CI, 1.38, 2.07), dependence before age 25 years (8.12; 95% CI, 6.33, 10.43) and past year dependence (1.93; 95% CI, 1.40, 2.64). Among dependent persons, relative to those who waited until they were 21 years or older, those who began drinking before age 14 years had 2.62 (95% CI 1.79, 3.84) times the odds of experiencing episodes exceeding 1 year and 2.89 (95% CI 1.97, 4.23) times the odds of experiencing 6 or 7 vs. 3 to 5 dependence symptoms after controlling for age, sex, race/ethnicity, highest grade in school, marital status, former and current smoking, drug use, history of antisocial behaviour before age 15 years, major depression before age 14 years, and family history of alcoholism.

Study ID	Methods	Participants	Results
Lo, 2000	The aim of the study was to evaluate the relationship between onset of age of drinking and the use of drugs. The study was based on data collected for the Monitoring the Future study. Six variables, assigned to the frequency of use of each of three drugs (alcohol, cannabis, and cocaine) during one's lifetime, and in the last 12 months, were used to measure drug-using behaviours. Timing of drinking initiation was measured by a question asking in which grade the respondent first tried an alcoholic beverage, meaning consuming more than a few sips.	Not reported.	The impact of onset drinking age was important in predicting frequency of lifetime alcohol use and frequency of annual alcohol use, accounting for over 20% of the variance of the annual measure, and for up to 50% of the lifetime measure. Onset drinking age also significantly predicted the cannabis-use and cocaine-use measures. An increase in the onset drinking age and the impact of the onset drinking age were associated with drops in the alcohol-use measures. The author stated that the present study demonstrated that onset drinking age is a consistent and stable factor affecting different kinds of drug use during an individual's late teen years.
McGue et al, 2001a	The aim of the study was to investigate whether the association of age at first drink with alcoholism was consistent with the hypothesis that the former causes the latter or the hypothesis that both are manifestations of some common vulnerability. Parent measures included substance abuse assessment, the Structured Clinical Interview for DSM-III-R, and an interview to assess antisocial personality disorder. Parents also completed the Multidimensional Personality Questionnaire and were asked how old they were when they first used alcohol. Age at first drink was categorised as <14, 14, 15, 16, 17, 18, 19 and >19 years.	Data was drawn from the Minnesota Twin Family Study (MTFS), which consisted of 1,383 families with adolescent twins.	The authors found an association between age at first drink and the rate of alcohol dependence in the sample of parents. For parents who reported their first drink before age 15, rates of alcohol dependence were greater than 45% in men and 20% in women, compared to 13% and 2% among men and women, respectively, who drank for the first time after the age of 19. Age of first drink was also associated with nicotine dependence, any drug diagnosis, conduct disorder and antisocial personality disorder. Men and women who started drinking before the age of 15 averaged approximately 1 year less of education and nearly 5 IQ points less than those who started drinking after 19 years.

Study ID	Methods	Participants	Results
McGue et al, 2001a continued	Twins completed the Diagnostic Interview for Children and Adolescents to ascertain diagnoses of attention-deficit hyperactivity disorder (ADHD), conduct disorder (CD), oppositional defiant disorder (ODD) and major depressive disorder (MDD). Mothers completed the parent version. In addition, teachers were asked to complete a Teacher Rating Form consisting of behavioural, personality, and academic items. Twins completed a substance use assessment, they were asked whether they had ever used alcohol without parental permission and, if so, at what age they first tried alcohol. Age at first drink was classified as <14 years, 14, 15, 16, 17 and 18, and never used. Twins also completed a battery of psychophysiological tests which included an event-related potential task.	Study is based on a subsample of 1,309 fathers and 1,361 mothers who reported ever having drunk alcohol, and 698 girls and 645 boys for whom the authors had clinical assessments at age 11 years and alcohol use reports at age 14 years.	The authors determined that overall, the odds of developing alcohol dependence was only 72% as large with each successive year's delay in age of first drink (OR 0.72; 95% CI: 0.68, 0.76). The authors noted that age at first drink was more strongly associated with conduct disorder (OR 0.65; 95% CI: 0.60, 0.70) and antisocial personality disorder (OR 0.54; 95% CI: 0.46, 0.64). The authors also found that each year's delay in age at first drink was associated with 0.17 (95% CI: 0.13, 0.21) more years of education (0.13 more years if the IQ effect is removed), 0.43 (95% CI: 0.15, 0.71) more IQ points, and 0.05 standard deviations lower on the Constraint scale. In twins, the rate of CD, ODD, and any externalising disorder was significantly and substantially increased among early drinkers (OR 1.96; 95% CI: 1.49, 2.58). Although the rate of ADHD was modestly increased among early drinkers, the observed OR was not significant at $p \leq 0.01$ (OR 1.57; 95% CI: 1.01, 2.46). There was no significant association between MDD and early drinking (OR 1.32; 95% CI: 0.70, 2.48).

Study ID	Methods	Participants	Results
McGue et al, 2001b	The authors sought to determine whether early age of first drink in parents is associated with increased behavioural problems and an early age of first drink in their adolescent offspring and whether age of first drink is heritable. See McGue et al, 2001a for assessment taken at intake and follow-up. The relationship between parent age of first drink and offspring functioning was determined by using logistic regression analysis for the categorical outcome (i.e. early alcohol use) and analysis of variance (ANOVA) for quantitative outcomes (i.e. the symptom-count scales).	Data was drawn from the Minnesota Twin Family Study (MTFS), which consisted of 1,383 families with adolescent twins. The family sample was based on 1,232 individual twins who completed an intake assessment at 11 years and follow-up assessment at 14 years and for who age of first drink could be determined for both biological parents. The twin sample was based on 641 twin pairs in which both members completed an intake and follow-up assessment.	Early use of alcohol was high among sons and daughters of parents who both had an early age of first drink (54.5% and 46.4%, respectively). Lifetime symptoms of externalising disorders (i.e. conduct disorder and oppositional defiant disorder), but not internalising disorders (i.e. major depressive disorder, separation anxiety disorder), were significantly higher in the sons but not the daughters of parents who began drinking before age 15 years. Symptoms of externalising disorders were highest among sons with early age of first drink in both their mothers and their fathers (73%) and lowest among sons who parents had not drunk before age 15 (21%). Based on the analysis of twin pairs the authors concluded that early use of alcohol is familial and, at least in males, heritable.

Study ID	Methods	Participants	Results
Monshouwer et al, 2003	The aim of the study was to understand the onset of alcohol use and first intoxication as a function of age, sex and a set of risk factors. Age of first alcohol use was measured by asking students how old they were when they first drank at least one glass of alcohol for the first time. Age of first intoxication was measured by asking students how old they were when they got drunk for the first time. The risk factor set included: gender, ethnicity and religion, family situation, father has a job, mother has a job, population density, and school type. Cox regression and multivariate logistic regression analysis, adjusting for all sociodemographic variables, was conducted.	Data were derived from the Dutch National School Survey on Substance Abuse (students aged 11-18 years). Study based on a sample of 7,094 students (mean age 14.3 years).	74% had drunk at least one glass of alcohol, and 44% had been drunk. Binge drinking (5+ glasses in a row) in the last 2 weeks was reported by 34%. At the age of 11 years, there was a 17% likelihood among girls and a 28% likelihood among boys that at least one glass of alcohol has been consumed. At the age of 13 years, 54% of the girls and 65% of the boys had used alcohol. At the age of 16 years, 87% of girls and 91% of boys had initiated alcohol consumption. A significant relationship was found for both boys and girls between the age of first alcohol use and first intoxication, indicating that a later age of first alcohol use was associated with a lower probability of first intoxication (boys: adjusted OR: 0.85; 95% CI: 0.73, 0.98; girls: adjusted OR: 0.79; 95% CI: 0.69, 0.90). Compared with non-drinkers, boys and girls who started drinking during the previous year were more likely to be older, have a life-time history of tobacco and cannabis use, go out at night, display delinquent behaviour, be a truant, and have peers who drink and smoke, have parents who approve of drinking, and have parents who use alcohol.

Study ID	Methods	Participants	Results
Pitkänen et al, 2005	The aim of the study was to investigate the relation between the age of onset of drinking and several indicators of alcohol use. Onset age of drinking was determined at ages 14, 20, 27, 36 and 42. The criterion for the onset of alcohol use was that the participant had been drunk or admitted using alcohol occasionally. Frequency of drinking was also assessed per occasion and days per year. Binge drinking was measured by asking participants how often during the past 12 months they had consumed so much alcohol that they had been truly drunk. Binge drinking was operationalised on the basis of the reported times of being drunk, but controlled with the frequency of having at least five drinks per occasion. Two alcoholism screening tests were used: the CAGE questionnaire and a modified version of the Michigan Alcoholism Screening Test (MAST).	Participants were drawn from the ongoing Finnish Jyvaskyla Longitudinal Study of Personality and Social Development. The most recent data were collected in 2001. The available sample was 336 participants and complete data on all measures used were available for 308 participants (142 women, 166 men). Data on the use of alcohol in adulthood were primarily collected at age 42.	All participants had used alcohol at some point during their lives. The mean age of onset of drinking was 15.5 years (range 10-30 years, SD = 2.4). Two per cent had begun drinking at age 10-11. The age of onset of drinking had a significant main effect on adult use of alcohol for both women ($p<0.001$) and men ($p<0.001$). Participants who began drinking at $\leq$13 years scored significantly higher in all indicators of adult use of alcohol (frequency of drinking, binge drinking and alcoholism screening tests) than the oldest group ($\geq$18 years), and 16-17-year-olds with the exception of women's binge drinking ($p=0.059$).

Study ID	Methods	Participants	Results
Prescott & Kendler, 1999	The purpose of the study was to evaluate the causal and non-causal hypotheses for the association between early drinking and alcohol-related diagnoses using data from twin pairs. Age of drinking onset was ascertained by asking participants how old they were when they had their first drink, other than as part of religious ceremony. Lifetime alcohol dependence and abuse were evaluated in participants who reported ever consuming ≥13 (male) or ≥7 (female) drinks in a single day or who answered 'yes' to any of the screening questions. The authors used logistic regression to predict probability of diagnostic classification from onset age. Pair-level data was used to investigate the aetiology of drinking onset and its association with diagnosis.	This article was based on data collected as part of two longitudinal studies of psychiatric and substance-related disorders in adult twins from the Virginia Twin Registry. Individual-level analyses are based on 8,746 participants with complete data on alcohol use and alcohol-related diagnoses. Twin-pair analyses were based on 4,646 individuals from same-sex twin pairs with known zygosity.	The results of the individual-level analyses showed that for each additional year before the initiation of drinking, the risk of developing alcohol dependence decreased by 21% (OR 1.21; 95% CI: 1.19, 1.24). The association between drinking onset and alcohol abuse was also significant (OR 1.10; 95% CI: 1.07, 1.12). In twin-pair analyses, the authors found that unaffected co-twins of twins with alcohol dependence or alcohol abuse began drinking earlier than twins from pairs in which neither twin had a diagnosis. The authors report that these findings suggest a familial-based vulnerability for early drinking onset, consistent with the 'shared vulnerability' hypothesis.

Study ID	Methods	Participants	Results
Stueve & O'Donnell, 2005	Reach for Health study. Survey administered in 7th and 10th grade included questions about alcohol use and sexual behaviour. Logistic regression was used to examine the relationship between early alcohol initiation, alcohol and sexual behaviours at 10th grade.	1,034 youths who attended both 7th and 8th grades and who completed surveys during 7th grade and 10th grade. 78.8% of the sample were Black and 18.7% Hispanic. Majority aged 11-12 years at baseline.	25.6% of participants reported lifetime alcohol use at baseline (7th grade) compared to 62.8% at follow-up (10th grade). Early initiation of alcohol use was significantly associated with recent alcohol use (adjusted OR 2.40; 95% CI: 1.75, 3.29), binge drinking in the past month (adjusted OR 1.87; 95% CI: 1.25, 2.80), getting drunk or high in the past year (adjusted OR 2.01; 95% CI: 1.23, 2.80), having more than two lifetime sexual partners (adjusted OR 1.54; 95% CI: 1.10, 2.26) and lifetime pregnancy (adjusted OR 1.73; 95% CI: 1.10, 2.70). There was no association with sexual initiation or having sexual intercourse within the past 3 months.
Swahn & Bossarte, 2007	The purpose of the study was to examine the cross-sectional associations between preteen alcohol use initiation and subsequent suicide ideation and attempts for boys and girls in a nationally representative sample of high school students. Variables included in the analysis were suicidal ideation, suicide attempts, alcohol initiation, substance use, dating abuse, sexual assault, fighting, weapon carrying and sadness. Logistic regression analyses were conducted to determine the association between preteen alcohol use initiation and suicide ideation or attempts relative to non-drinkers and also relative to teen initiators while controlling for potential confounders.	The study was based on data collected in 2005 for the Youth Risk Behavior Surveillance System (n=13,917 students in grades 9-12).	25.4% of participants reported drinking before age 13. Adjusted logistic regression models (controlling for gender, grade, race/ethnicity, substance use, weapon carrying, physical abuse by dating partner, sexual assault, and sadness) showed that alcohol use initiated at any age was significantly associated with suicide ideation (<13 years vs. non-drinkers: OR 1.89; 95% CI: 1.46, 2.44) and suicide attempts relative to non-drinkers. (<13 years vs. non-drinkers: OR 2.71; 95% CI: 1.82, 4.02). Alcohol use initiation before age 13 was associated with an increased likelihood of suicide ideation (OR 1.24; 95% CI: 1.03, 1.48) and attempts (OR 1.32; 95% CI: 1.04, 1.66) relative to teen alcohol use initiation.

Study ID	Methods	Participants	Results
Swahn et al, 2008	The objective of the study was to examine the cross-sectional associations between reports of an early age of alcohol use initiation and suicidal ideation, suicide attempts, and peer and dating violence victimisation and perpetration among high-risk adolescents. Age of drinking onset was determined across 6 categories (<9 years old, 9 or 10 years old, 11 or 12 years old, 13 or 14 years old, 15 or 16 years old, and 17 years or older) by asking students how old they were when they had their first drink of alcohol other than a few sips. Six outcome measures were examined in the study: dating violence victimisation and perpetration, peer violence victimisation and perpetration, suicidal ideation, and suicide attempts. Logistic and multinomial logistic regression analyses were conducted to determine the association between alcohol use initiation before age 13 and involvement in the 6 violent outcome measures, relative to non-drinkers.	The study was based on data from the 2004 Youth Violence Survey of 4,131 students in grades 7, 9 and 11/12 in a school district in a high-risk community.	Among the seventh-grade study participants, 35.2% had their first drink of alcohol before 13 years of age and 64.7% reported no use of alcohol. After adjusting for demographic characteristics, heavy episodic drinking, other substance use, peer drinking, depression, and impulsivity, alcohol use before the age of 13 was significantly associated with dating violence perpetration (OR 1.89; 95% CI: 1.09, 3.26) and victimisation (OR 2.01; 95% CI: 1.23, 3.28), peer violence perpetration (OR 1.51; 95% CI: 1.07, 2.13), suicidal ideation (OR 2.20; 95% CI: 1.38, 3.49), and suicide attempts (OR 3.27; 95% CI: 1.86, 5.73), relative to non-drinkers. However, alcohol use before the age of 13 was not significantly associated with peer violence victimisation (OR 1.36; 95% CI: 0.98, 1.89). After controlling for peer delinquency and parental monitoring in addition to other confounders alcohol use initiation before age 13 was significantly associated only with dating violence victimisation (OR 1.83; 95% CI: 1.08, 3.13), suicidal ideation (OR 1.92; 95% CI: 1.16, 3.18), and suicide attempts (OR 3.04; 95% CI: 1.66, 5.57), relative to non-drinkers; there were no significant associations between preteen alcohol use initiation and violence perpetration (dating violence: OR 1.51; 95% CI: 0.83, 2.75/peer violence OR 1.34; 95% CI: 0.91, 1.96). The authors also examined the prevalence of involvement in multiple forms of violent behaviours. Compared with non-drinkers, students who initiated alcohol use before age 13 had greater involvement in violent behaviours (≥3 violent behaviours: 29.5% vs. 8.3%; p<0.05).

Study ID	Methods	Participants	Results
Takakura & Wake, 2003	The study examined the relationship between age of onset for smoking and subsequent patterns of smoking and drinking among high school students in Japan. Data collection was based on the Youth Risk Behavior Surveillance questionnaire. Heavy drinking was defined as drinking alcohol on 10 or more days in the past month.	The study sample consisted of 1,308 students in grades 10-12 who completed the alcohol use questions.	38.4% of the sample were current drinkers and 3.0% were heavy drinkers. After adjustment for confounding factors, compared with students who started drinking at 15 years or older, students who started drinking at 12 years or younger, or 13 or 14 years, were more likely to be current drinkers (≤12 years: OR 1.9; 95% CI: 1.4, 2.5/13 or 14 years: OR 1.6; 95% CI: 1.2, 2.2) and were more likely to report drinking heavily (≤12 years: OR 4.6; 95% CI: 1.7, 12.9/13 or 14 years: OR 4.5; 95% CI: 1.6, 13.2).
Thomas et al, 2000	The study examined relationships among adolescent alcohol misuse, sexual risk-taking behaviours, parental monitoring, and demographic variables. The following measures were used in the study to assess alcohol consumption: total alcohol consumption, times drunk within the past year, and 5+ drinks within the past year. Respondents were asked how old they were when they got drunk for the first time, and how old they were the first time they had sexual intercourse.	561 families with adolescents aged 13-16 participated in all four waves of the study.	Adolescents who got drunk later exhibited less alcohol misuse in late adolescence. Adolescents who had a later onset of drunkenness showed a 'dampening effect' on later sexual risk-taking behaviours. However, onset of sexual behaviour had no significant effect on alcohol misuse at Wave 4. The major finding is that early onset of drunkenness was associated with increases in alcohol misuse and sexual risk-taking behaviours. Wave 3 alcohol misuse, when adolescents were 15-18 years old, had a significant effect on Wave 4 alcohol misuse, a year later. Wave 3 sexual risk taking had a significant effect on Wave 4 sexual risk-taking behaviours. However, the present study did not find support for longitudinal crossover effects between alcohol misuse and sexual risk-taking.

Study ID	Methods	Participants	Results
Warner & White, 2003	The aim of the study was to examine the predictive relations among age of first use, context of alcohol initiation and problem drinking. Self-reported problems experienced as a result of drinking alcohol during the last 3 years were used to construct a proxy measure of lifetime DSM-IV alcohol abuse and dependence. Participants who met the criteria were categorised as problem drinkers. Participants were asked the age at which they tried alcohol for the first time. Participants were classified as 'early users' if their first drink occurred before the age of 11.	Data are from the Rutgers Health and Human Development Project, a five-wave prospective study in a community sample. Adolescents aged 12, 15 and 18 were recruited between 1979 and 1981. All participants were re-interviewed over a 13 year period at 5 data collection points at ages 12, 15, 18, 25 and 30-31 years. The sample were restricted to 371 participants were reported ever drinking between 12-18 years.	The mean age of drinking onset was 10.7 years. Seventy-three per cent of the sample reported a first drinking experience at a family gathering (mean age of initiation 8.6 years; 81% reported drinking before age 11). For those who initiated drinking outside of the family, the mean age of onset was 14.2 years, with 18% reporting onset of drinking under the age of 11. A significantly greater proportion of early onset drinkers developed alcohol-related problems than late onset drinkers (46.8% vs. 27.3%; $p<0.01$). Participants who began drinking outside the family within 5 years or less were also more likely to experience problem drinking compared to those who reported 5 years or more (47% vs. 34%; $p<0.05$). Youth who initiated drinking at an early age outside a family gathering showed the highest rate of drinking problems (78% vs. 28% late onset drinkers outside the family gathering; $p<0.0001$). Compared to participants who initiated drinking at older ages at a family gathering, both early initiates who first drank at a family gathering and early initiates who first drank outside a family gathering had significantly higher odds of developing problems associated with alcohol use (OR 2.86; 95% CI: 1.36, 6.00/OR 8.32; 95% CI: 2.28, 30.41, respectively). When there was relatively faster transition from first drinking in a family context to drinking outside (<5 years), the odds of problem drinking were significantly greater than when 5 or more years elapsed (OR 2.54; 95% CI: 1.45, 4.42). Feeling drunk was the only variable related to first use experience that significantly predicted problem drinking when other risks were included.

Study ID	Methods	Participants	Results
York et al, 2004	The study was designed to determine the relationship of age at first drink to traditional drinking variables as well as novel current drinking variables. Age of first drink was ascertained by asking participants how old they were when they had their first drink, other than just a taste. Alcohol intake variables based on the past 12 months were also collected including measures of alcohol abuse and dependence from the Diagnostic Interview Schedule for DSM-IV. An age of first drink of 14 years or younger was chosen as an indicator of early drinking. To investigate the relationship between age at first drink and alcohol abuse or dependence, logistic regression analyses using age at first drink as a predictor variable were run with the dependent variables being (a) the presence of current alcohol abuse or dependence or (b) the presence of lifetime alcohol abuse or dependence. Age, race/ethnicity, and current or former drinking status were also entered as covariates.	Data collected as part of large national survey of US residents aged 18 and older. Study based on data from 2,276 participants (mean age 44.6 years) who reported their age of first drink.	Age of first drink was not significantly related to the probability of current alcohol abuse or dependence after adjusting for age and other confounders, but was significantly related to the probability of lifetime alcohol abuse or dependence. For an increase of 1 year in the age at first drink, the odds of lifetime abuse or dependence are reduced by 12% for each year of increase in the age at first drink. The authors also found a significant association of current alcohol intake measures (quantity, frequency, duration, average daily consumption and peak blood alcohol concentration) and age of first drink.

Study ID	Methods	Participants	Results
Zakrajsek & Shope, 2006	The authors compared alcohol use and alcohol misuse from grade school through young adulthood with age of drinking onset to determine whether those with earlier drinking initiation reported more risky drinking over time. Age of drinking onset was determined from participant's age when they first reported drinking on the Adolescent Survey. Participants were assigned to one of five Drinking Onset categories: non-drinker; school non-drinker (was a non-drinker through to the Grade 12 survey); Grade 12 onset (was a non-drinker through to the Grade 10 survey); Grade 10 onset (was a non-drinker through to the Grade 7/8 survey); or earliest onset (reported drinking on one of the 5th to 8th grade surveys). Other variables included in the analysis were alcohol use, alcohol misuse, and risky driving. Differences in alcohol use and alcohol misuse between drinking onset groups were examined with analysis of variance (ANOVA). A log-binomial regression model was used to compare drinking onset and the likelihood of having a risky offence, alcohol offence, crash, or alcohol crash during each of the three age periods. Risk ratios and 95% confidence intervals were calculated to compare the likelihood of each risky driving event by drinking onset. Log-binomial regression models were run for each drinking onset group.	Participants were 1,738 young adults, from the high school graduation classes of 1991 and 1992, who had participated in the longitudinal Alcohol Misuse Prevention Study.	58% reported drinking on one of the 5th to 8th grade surveys (earliest Drinking Onset group; n=1,017), 24% first reported drinking on the 10th grade survey (n=426), 7% first reported drinking on the 12th grade survey (n=126), 4% first reported drinking on the young adult survey (school non-drinker group; n=69), and 6% were classed as non-drinkers (n=100). The earliest Drinking Onset group was 1.2 times more likely than all other groups to have a risky offence (e.g. speeding and careless driving) before age 21 (95% CI 1.1, 1.4). Those with Grade 10 onset were 1.4 times more likely than those who started drinking later or were non-drinkers to have a risky offence before age 21 (95% CI 1.1, 1.9). There were no significant differences in the likelihood of having a risky offence during the older age period for any drinking onset group. The earliest Drinking Onset group was 2.2 times more likely than all other groups to have an alcohol offence before age 21 (95% CI 1.2, 3.9), 1.6 times more likely to have an alcohol offence between age 21-25 (95% CI 1.0, 2.4), and 2.8 times more likely to have an alcohol offence from age 26 onwards (95% CI 1.5, 5.3). Those with Grade 10 onset were 3.3 times more likely than those who started drinking later or were non-drinkers to have an alcohol offence between age 21-25 (95% CI 1.3, 8.6). Differences in the likelihood of a crash or alcohol-related crash by drinking onset did not reach significance during any age period.

Table 4: Acute consequences of adolescent alcohol consumption

Study ID	Methods	Participants	Results
Best et al, 2006	The study investigated excessive drinking and associations with other problem behaviours in seven London secondary schools. Psychological health was assessed using the 20-item questionnaire on anxiety and depression taken from the Maudsley Addiction Profile (MAP). Data on alcohol, tobacco and illicit drug use were collected using the Maudsley Addiction Profile (MAP) drug grid. Excessive drinking was defined as drinking at a level of consumption that could be expected to produce intoxication with significant impairment of thinking, judgement and behaviour. This was operationally defined for the present study as 'consumption of more than 10 standard units of alcohol on any drinking occasion'. Measures were taken for lifetime episodes of excessive drinking, and participants were classified into four groups on the basis of responses to this question (non-drinkers, drinkers with no episodes of excessive drinking, those with 1 to 4 such episodes, and those with 5 or more episodes).	2,078 school students aged 14-16 years.	To control for correlations between variables, a logistic regression analysis was conducted to investigate factors which were associated with excessive drinking. The variables which were found to be related to excessive drinking included use of cannabis, more positive attitudes towards illicit drug use, frequency of cigarette smoking, lower anxiety scores, higher depression scores, and greater involvement in delinquent acts. Factors associated with excessive drinking OR 95% CI Cannabis use 2.99 2.29, 3.90 Ecstasy use 1.68 0.76, 3.71 Cocaine use 0.89 0.47, 1.69 Smoking frequency 1.04 1.02, 1.05 Anxiety 0.94 0.91, 0.98 Depression 1.05 1.02, 1.08 Educational aspirations 0.94 0.87, 1.01 Drug attitudes 1.25 1.16, 1.34 Delinquent acts (total) 1.26 1.17, 1.36

Study ID	Methods	Participants	Results
Bonomo et al, 2001	The aim of the study was to compare the occurrence of behaviours occurring under the influence of alcohol and to determine associated risk factors for different behaviours. Data were obtained from the Adolescent Health Survey. Respondents were asked whether they had drunk any alcohol in the past 12 months. Respondents who reported drinking in the week prior to the survey were asked to complete a 1-week retrospective alcohol diary. High dose drinking was defined as 5 or more units of alcohol per drinking day. Respondents were also asked about problems that resulted from drinking alcohol in the past 12 months: (i) had sex and later regretted it; (ii) had sex without contraception; (iii) had an accident; and (iv) been involved in a physical fight. Antisocial behaviours were evaluated with 10 items and included behaviour relating to property damage, interpersonal conflict, and theft. A computerised form of the Clinical Interview Schedule was used to assess psychiatric morbidity.	658 students aged 16-17 years.	There was an elevated risk of alcohol-related injuries in those who reported high dose drinking (OR 2.3; 95% CI: 1.3, 4.0) and those reporting antisocial behaviours (OR 2.4; 95% CI: 1.4, 4.1). Respondents who reported that most of their peers were drinkers also had increased odds of alcohol-related injuries (OR 3.3; 95% CI: 1.4, 8.1). Drinking alcohol more than two days a week was not associated with alcohol-related injury (OR 2.7; 95% CI: 0.94, 7.5). Both psychiatric morbidity and antisocial behaviour were associated with alcohol-related sexual risk taking. In addition, young people who reported that their parents drank daily had an increased risk of any alcohol-related sexual risk taking. There was no association with the measures of alcohol use (alcohol >2 days/week and high dose drinking).

Study ID	Methods	Participants	Results
Champion et al, 2004	The purpose of the study was to examine the relationship between substance use, other health risk behaviours and sexual victimisation among adolescent females. The study was based on data collected as part of the Enforcing Underage Drinking Laws programme. Participants were asked about sexual victimisation (experiences of attempted or actual sex against their will). In the 1999 survey only 'ever drinkers' were asked this question. In terms of alcohol use, participants were asked how old they were when they had their first drink of alcohol when they were not with their parents or other adults in their family, lifetime use, past year use, past 30 day use and past 7 day use. Binge drinking (5+ drinks in a row within the past 2 weeks), drinking and driving, riding with a driver who had been drinking, attempting to purchase alcohol in the past 30 days, and drinking beer from a keg or party ball in the past year were also used to characterise participants' alcohol use. Logistic regression analysis was used to examine the association between alcohol use and other risk behaviours, and sexual victimisation.	Participants aged 16-20 years were sampled in 1999 and 2000. A total of 647 female 'ever drinkers' were included in the 1999 sample and 1,236 'never' and 'ever drinkers' were included in the 2000 sample.	1999: Binge drinking, sex without birth control, and past 30 day cannabis use were associated with experiencing attempted or actual forced sex. Females who reported binge drinking were 3 times as likely to have experienced sexual victimisation (OR 3.0; 95% CI: 1.43, 6.28). 2000: Having experienced sexual victimisation was significantly associated with age at first drink, sex without the use of birth control, past 30 day cannabis use, and having been in a fight. Females who had had their first drink between the ages of 16 and 20 years were 5 times as likely to have experienced sexual victimisation (OR 5.14; 95% CI: 1.89, 13.98). The results across all categories of age of first drink were as follows: Age of first drink* OR 95% CI 6 – 12 8.12 2.77 – 23.78 13 6.46 2.16 – 19.34 14 4.22 1.41 – 12.66 15 6.06 2.42 – 15.14 16 – 20 5.14 1.89 – 13.98 *compared to those who never drank

Study ID	Methods	Participants	Results
Cooper et al, 1994	The study examined the links between drinking and a range of risk behaviours in a large representative sample of adolescents on two specific occasions of intercourse: (i) first intercourse ever; and (ii) first intercourse with most recent partner. Lifetime alcohol involvement as assessed as a composite of two items: (i) usual quantity of consumption; and (ii) frequency of drinking to intoxication. Respondents were also asked about substance use before and during intercourse. Three high risk sexual behaviours were assessed for both occasions of intercourse: condom use, prior discussion of risk-related topics, and degree of partner intimacy.	Analyses were based on 1,259 sexually experienced respondents aged 13-19 years. A final sample of 1,176 provided first intercourse data and 898 provided first intercourse with most recent partner data.	Drinking proximal to intercourse was associated with significant increases in risky behaviours for both occasions of intercourse, with the exception of condom use at first intercourse with most recent partner, where adolescents who drank were no less likely to use a condom than those who did not.

Study ID	Methods	Participants	Results
Dukarm et al, 1996	The study investigated the relationship between substance use and violent behaviour based on data from the 1991 National Youth Risk Behavior Study. Violence, or potential for violent behaviour, was assessed by asking respondents whether they had carried a weapon in the past 30 days and the number of times that they had been in a physical fight within the past year including the number of times that an injury that required medical treatment had been sustained. Respondents were also asked their age at initiation, frequency of use in the past 30 days and lifetime use of a range of substances including alcohol.	12,272 respondents aged 15-18 years.	Weapon carrying and physical fighting were reported with greater frequency by adolescents who reported using alcohol and other substances. Weapon carrying and physical fighting were significantly associated with alcohol use in males (weapon carrying: OR 2.6; 95% CI: 2.1, 3.2; physical fighting: OR 2.2; 95% CI: 1.8, 2.6) and females (weapon carrying: OR 2.8; 95% CI: 2.1, 3.7; physical fighting: OR 2.0; 95% CI: 1.7, 2.3).
Dye & Upchurch, 2006	The study examined whether the effects of level of alcohol consumption on condom use at first sex depends on adolescent's gender based on data from Wave 1 of the National Longitudinal Study of Adolescent Health. Respondents were asked about their sexual and contraceptive histories, alcohol use at first intercourse and sociodemographic and family background. Alcohol use was coded as follows: (i) no alcohol use; (ii) some alcohol use; and (iii) inebriated.	6,867 students in grades 7-12.	Compared to girls who did not consume any alcohol, inebriated girls were significantly less likely to use a condom at first intercourse (OR 0.43; $p<0.001$); there was no difference for girls with some alcohol use. Boys regardless of their level of alcohol use, were not significantly different from girls who did not use alcohol in the likelihood of condom use. These findings held when the authors adjusted for individual-level variables and family background characteristics. Girls who were inebriated at first sex had the lowest probabilities of condom use at all ages of first sex; girls who were inebriated and who had first sex <14 years had the lowest overall probability (0.384). The variation in the probabilities of condom use over categories of alcohol use and age at first sex was smaller for boys than girls.

Study ID	Methods	Participants	Results
Fergusson & Lynskey, 1996	Data from Christchurch Health and Development Study, a 16-year longitudinal study of a birth cohort of children born during mid-1977. Data analyses were alcohol misuse at 15-16 years, measures of early onset sexual activity and sexual risk taking behaviours. Alcohol misusers were classified as those prone to abusive or hazardous drinking based on frequency of drinking, amounts consumed and alcohol-related problems in the past year.	953 children for whom there were complete data available.	Both boys and girls who misused alcohol reported higher rates of sexual intercourse, were more likely to report multiple (three or more) partners, and reported higher rates of unprotected intercourse than those who did not misuse alcohol. After adjustment for common and correlated risk factors there were small to moderate associations between alcohol misuse and early onset sexual activity [boys: OR 2.9 (95% CI 1.4, 6.0); girls: OR 6.2 (95% CI 1.6, 23.4)], and alcohol misuse and unprotected intercourse [boys: OR 6.9 (95% CI 2.5, 18.9); girls: OR 4.5 (95% CI 1.7, 11.9)]. There was no significant relationship between alcohol misuse and multiple partnerships [boys: OR 1.3 (95% CI 0.4, 4.1); girls: OR 1.9 (95% CI 0.7, 5.5)].
Fergusson & Horwood, 2000	The aim of the study was to examine linkages between patterns of alcohol abuse and crime. Data collected during the course of the Christchurch Health and Development Study, a longitudinal study of 1,265 children born in mid-1977.	Analysis based on 1,063 respondents for whom information on alcohol use and offending was available on at least one assessment between age 15-21 years.	Analysis of the association between alcohol abuse and crime rates showed that in all cases there was evidence of statistically significant increases ($p<0.01$) in rates of violent and property crimes with increases in symptoms of alcohol abuse. After controlling for confounding factors and observed time dynamics, there were still significant ($p<0.001$) associations between alcohol abuse and crime. The incidence rate ratios showed that a one-symptom increase in alcohol abuse was associated with a 1.15 times increase in the rate of violent crime and a 1.10 times increase in the rate of property offending.

Study ID	Methods	Participants	Results
Fergusson et al, 1996	Data collected during the course of the Christchurch Health and Development Study, a longitudinal study of 1,265 children born in mid-1977. Alcohol misuse was measured at 15-16 years by asking respondents about the frequency and quantity they drank and also any alcohol-related problems. In addition, respondents were questioned about juvenile offending using the Self-Report Early Delinquency Scale.	953 respondents for whom there was complete data for alcohol misuse and juvenile offending at age 16 years.	After adjustment for covariate factors, there was a small but significant association between alcohol misuse and violent offending [adjusted OR 3.2 (95% CI 1.4, 7.6)] but not property offences [adjusted OR 1.4 (95% CI 0.6, 3.3)].
Fortenberry et al, 1997	The study evaluated the potential causal relationship between alcohol and drug use and behaviour that increases the risk of sexually transmitted diseases. Participants were asked to record dates of each sexual intercourse, initials of the sex partner, whether a condom was used, and whether alcohol or drugs were used before intercourse.	82 female clients aged 16-19 years of an STD clinic and adolescent health clinic.	Event-specific condom use was significantly influenced by usual level of condom use ($p<0.001$), but not by event-specific substance use or partner change.

Study ID	Methods	Participants	Results
Jiang et al, 2008	The study examined associations between alcohol and medically attended injuries by urban-rural geographic status. Data were obtained from the 2001-2002 Health Behaviour in School-aged Children survey. Respondents were asked questions about injuries that had occurred during the past 12 months. 'Serious injuries' were categorised using the Modified Abbreviated Injury Score (MAIS) as: (i) hospital admission overnight; (ii) missed at least one full day of school or usual activities; or (iii) internal injury requiring surgery. Participants were also asked about alcohol consumption patterns.	7,031 participants aged 11-15 years.	After adjusting for age, sex, ethnicity and SES, for all types of alcoholic drink, the relative risk of reporting a serious injury rose with increasing frequency of alcohol. Current alcohol use — RR — 95% CI Never — 1.00 ≤1 day/week — 1.42 — 1.27, 1.58 2-4 days/week — 1.67 — 1.35, 2.02 ≥5-6 days/week — 2.05 — 1.66, 2.44 Been drunk in life Never — 1.00 Once — 1.58 — 1.37, 1.79 2-3 times — 1.47 — 1.24, 1.71 ≥4 times — 1.74 — 1.51, 1.98

Study ID	Methods	Participants	Results
Kim-Godwin et al, 2007	The study was designed to assess associations between sexual behaviours and alcohol using the Youth Risk Behavior Study (YRBS). The study focused on sexual behaviours and alcohol use. Six measures of sexual behaviours were included: (i) lifetime sexual experience; (ii) age of initiation; (iii) current sexual experience; (iv) number of sex partners (lifetime); (v) condom use; and (vi) use of contraceptive methods during the last sexual intercourse. Risky sexual behaviours were assessed by: (i) use of alcohol or drugs before having sexual intercourse; (ii) dating-violence (have been hit, slapped, or physically hurt on purpose by a boyfriend or girlfriend during the past 12 months); and (iii) physically forced sex (have been physically forced to have sexual intercourse when they did not want to). A final measure asked whether adolescents had been taught about AIDS/HIV infection in school. Four measures of alcohol behaviours were included: (i) ever drank alcohol; (ii) age of initiation; (iii) currently drinking (at least one drink of alcohol during the past 30 days); and (iv) binge drinking (five or more drinks in a row during the past 30 days). Logistic regression analysis was used to assess associations between sexual behaviours and alcohol use.	A total sample of 619 middle school students and 375 high school students participated in the current study (age range, 10-18 years). USA-based study.	Drinking patterns were strongly associated with the overall sexual behaviours, but not with whether students had been taught about AIDS or HIV. Among middle school students, alcohol experience and initiation of alcohol use were significantly associated with sexual experience, initiation of sex, number of partners, and condom use. Among the high school students, all four alcohol behaviours (alcohol experience; initiation of alcohol; current drinking; and binge drinking) were associated with sexual experience, initiation of sex, number of partners, currently sexually active, condom use, alcohol and drug use before sex, forced sex, and dating violence.

Study ID	Methods	Participants	Results
Lavikainen et al, 2008	The study assessed the relationship between negative experiences and frequency of alcohol drinking and drunkenness based on Finnish data from the European School Project on Alcohol and Other Drugs (ESPAD). Respondents were asked about lifetime alcohol use and drunkenness, and negative experiences because of their alcohol use.	3,321 Finnish adolescents aged 15-16 years.	Drunkenness, but not frequency of alcohol use, was significantly related to engaging in sexual intercourse regretted the next day ($p<0.001$), and getting into trouble with the police ($p<0.001$). Both alcohol use and drunkenness were significantly related to engaging in sexual intercourse without a condom, and getting into a scuffle or fight (all $p<0.001$). Regretted sexual intercourse OR 95% CI Use of alcohol Never 1.00 1-5 occasions 0.96 0.31, 2.99 6-19 occasions 1.25 0.40, 3.89 ≥20 occasions 1.75 0.51, 6.00 Drunkenness Never 1.00 1-5 occasions 2.44 1.14, 5.25 6-19 occasions 7.92 3.51, 17.87 ≥20 occasions 20.53 8.28, 50.92 Sexual intercourse without condom OR 95% CI Use of alcohol < 20 occasions 1.00 ≥20 occasions 2.47 1.61, 3.78 Drunkenness < 20 occasions 1.00 ≥20 occasions 5.26 3.49, 7.92

Study ID	Methods	Participants	Results		
Lavikainen et al, 2008 continued			Trouble with the police		
			Use of alcohol		
			Never	1.00	
			1-5 occasions	1.18	0.61, 2.30
			6-19 occasions	1.27	0.57, 2.84
			≥20 occasions	1.52	0.68, 3.38
			Drunkenness		
			Never	1.00	
			1-5 occasions	1.99	1.20, 3.28
			6-19 occasions	3.60	2.03, 6.37
			≥20 occasions	10.45	5.68, 19.23
			Scuffle or fight		
			Use of alcohol		
			Never	1.00	
			1-5 occasions	1.22	0.92, 1.62
			6-19 occasions	1.57	1.11, 2.22
			≥20 occasions	2.35	1.62, 3.40
			Drunkenness		
			Never	1.00	
			1-5 occasions	1.17	0.90, 1.53
			6-19 occasions	1.03	0.78, 1.37
			≥20 occasions	2.17	1.55, 3.05

Study ID	Methods	Participants	Results
Lowry et al, 1994	The study examined whether use of alcohol and other substances was related to the likelihood of sexual behaviours that increase the risk for HIV. The study used data from the Youth Risk Behavior Surveillance System. Respondents were asked about their lifetime substance use and the following sexual risk behaviours were examined: (i) ever having had sexual intercourse; (ii) having had sexual intercourse with four or more partners; and (iii) not having used condoms at last intercourse.	11,631 US high school students in grades 9-12.	Compared with students who reported no substance use, students who used only alcohol or cigarettes were significantly more likely to have ever had sexual intercourse (OR 4.0; 95% CI: 3.0, 5.4), and to have had four or more sexual partners (OR 2.7; 95% CI: 1.7, 4.2). However, there was no difference in condom use at last sexual intercourse (OR 1.2; 95% CI: 0.8, 1.8).
Mattila et al, 2005	The aim of the study was to investigate the occurrence, nature, and severity of violence and violence-related injuries. The study was part of the Adolescent Health and Lifestyle Survey (AHLS), a national monitoring system of adolescent health and health-related lifestyles. Occurrence of violence was asked with the question: 'Have you, during the past month, been in a fight or subject to violent actions?'	8,135 Finnish adolescents (12-18 years old).	Among the sample, 27% of adolescents who had experienced alcohol-related violence reported an injury, while the corresponding figure in alcohol-free violent events was 17% (p=0.006). Boys reported alcohol-related injuries more frequently than girls (52% vs. 31%; p=0.015). Alcohol had no effect on the type or anatomical distribution of injury or staying away from school or hobbies. Alcohol-related violence most often occurred at leisure-time (86% in boys and 75% in girls) and the home (6% and 22%, respectively) and where the other party was a stranger (55% in boys and 34% in girls) or a person the victim already knew (23% in boys and 34% in girls). The overall percentage of adolescents reporting violence under the influence of alcohol was 2.4%. Among 14-year-olds, 13% reported being under the influence of alcohol at the time of violence, and the corresponding figures for 16- and 18-year-olds were 41% and 62%, respectively (p<0.001). There was no significant difference between genders.

Study ID	Methods	Participants	Results
Miller et al, 2007	The study evaluated the characteristics of high school students who drink; the drinking patterns among these students; and the association between binge drinking and other health risk behaviours, such as drinking and driving, risky sexual behaviour, tobacco use, interpersonal violence, suicide, and other drug use. The study was based on data from the 2003 National Youth Risk Behavior Survey (YRBS). Respondents were categorised as: non-drinkers (no drinking during the past 30 days); current drinkers (consuming ≥1 drink during the past 30 days) who did not binge drink (consuming ≥5 drinks in a row during the past 30 days); or, current drinkers who binge drank.	14,114 US high school students in grades 9-12.	Compared with non-drinkers, current drinkers who did not binge drink were more likely to ride with a driver who had been drinking (OR 3.5; 95% CI: 2.8, 4.2), be currently sexually active (OR 2.2; 95% CI:1.9, 2.6), drink or use drugs before last sexual intercourse (OR 2.3; 95% CI: 1.5, 3.4), to have ever been or gotten someone pregnant (OR 1.7; 95% CI: 1.2, 2.4), smoke cigarettes or cigars (OR 4.2; 95% CI: 3.3, 5.3), use smokeless tobacco (OR 1.9; 95% CI: 1.2, 3.1), be involved in a physical fight (OR 2.3; 95% CI: 2.0, 2.6), experience dating violence (OR 1.9; 95% CI: 1.5, 2.3), have forced intercourse (OR 1.6; 95% CI: 1.2, 2.1), consider or attempt suicide (OR 1.9; 95% CI: 1.5, 2.2 and OR 2.0; 95% CI 1.6, 2.7), and use cannabis (OR 5.6; 95% CI: 4.8, 6.5), cocaine (OR 5.9; 95% CI: 2.8, 12.3), and inhalants (OR 3.2; 95% CI: 2.2, 4.6). Current drinkers who did binge drink were more likely to engage in the following health risk behaviours than non-drinkers: rode with a driver who had been drinking alcohol (OR 10.8; 95% CI: 9.0, 13.1); be currently sexually active (OR 5.5; 95% CI: 4.5, 6.5); have used alcohol or drugs before last sexual intercourse (OR 10.3; 95% CI: 7.1, 14.8); to have ever been, or gotten someone pregnant (OR 4.7; 95% CI: 3.4, 6.5); smoke cigarettes or cigars (OR 18.9; 95% CI: 15.3, 23.4); use smokeless tobacco (OR 7.9; 95% CI: 5.2, 12.1); be involved in a physical fight (OR 4.4; 95% CI: 3.9, 5.1); experience dating violence (OR 3.7; 95% CI: 3.0, 4.5); have forced intercourse (OR 3.7; 95% CI: 2.8, 4.9); consider or attempt suicide (OR 2.5; 95% CI: 2.1, 3.1/OR 4.3; 95% CI 3.5, 5.4); and use cannabis (OR 21.4; 95% CI: 17.0, 26.9), cocaine (OR 63.2; 95% CI: 30.6, 130.6), and inhalants

Study ID	Methods	Participants	Results
Miller et al, 2007 continued			(OR 12.3; 95% CI: 8.1, 18.7). Condom use during last sexual intercourse was not associated with drinking status. Binge drinkers were more likely to engage in health risk behaviours than current drinkers who did not binge such that the ORs for the binge drinkers was 1.3 to 10.7 times the ORs for the current drinkers who did not binge (data not reported). Logistic regression analysis revealed a strong and statistically significant ($p<0.05$) dose-response relationship between the frequency of binge-drinking days among current drinkers and the prevalence of the risk behaviours examined.
Morrison et al, 2003	The study assessed the extent to which the same individual used condoms, depending upon whether alcohol use had preceded specific sexual encounters. Respondents were asked about sexual behaviours (e.g. whether a condom was used, partner type) and alcohol consumption. Drinking occasions were matched with sexual encounters if drinking occurred within four hours before having sex.	112 sexually experienced adolescents (14-19 years).	The odds of condom use were not associated with whether a participant had been consuming alcohol before sex (OR 1.06; 95% CI: 0.60, 1.87), nor were associated with the number of drinks consumed before sex (OR 1.22; 95% CI: 0.69, 2.14).

Study ID	Methods	Participants	Results
Ramisetty-Mikler et al, 2004	The study examined ethnic differences in substance use and sexual behaviour, and whether drinking and drug use constituted risk factors for unsafe sexual practices. Data were taken from the Hawaii YRBS. Respondents were asked if they had ever engaged in sexual activity and the age of initiation, whether they were currently sexually active (engaged in sexual activity in the past 3 months), number of people they had had sex with in their lifetime and the past 3 months and the use of alcohol or drugs in conjunction with last intercourse. Respondents were also asked the age when they first drank alcohol, drinking pattern, and smoking and drug use. Students were placed into three drinking categories: abstainer (never drank); non-episodic (drank 3+ days but not 5 or more drinks at any time within a two-hour period); and episodic (drank one or more times 5 drinks or more any time within a two-hour period any day).	2,657 US high school students in grades 9-12.	Compared to abstainers, episodic drinkers were significantly more likely to have: engaged in a sexual activity (OR 2.8; 95% CI: 2.0, 3.9); used alcohol or drugs before sex (OR 5.6; 95% CI: 3.2, 9.8); had multiple partners in their lifetime (OR 3.5; 95% CI: 2.3, 5.3); and had multiple partners in the last 3 months (OR 5.7; 95% CI: 2.6, 12.4). Compared to abstainers, non-episodic drinkers were significantly more likely to have had multiple partners in their lifetime (OR 1.6; 95% CI: 1.1, 2.3); ever had intercourse (OR 1.4; 95% CI: 1.0, 3.8); had two or partners in the past 3 months (2.9; 95% CI; 1.1, 7.6); but use of alcohol/drugs before sex was not associated with non-episodic drinking.
Rashad & Kaestner, 2004	Using data from the first waves of the National Longitudinal Survey of Adolescent Health and the 1997 National Longitudinal Survey of Youth, the authors call into question methods used to determine whether there is a causal relationship between substance use and sexual behaviour.	Re-analysis of data used by Rees et al (2001) and Sen (2002).	The authors conclude that in spite of attempts to estimate the causal relationship between substance use and sexual behaviour, it remains unknown.

Study ID	Methods	Participants	Results
Rees et al, 2001	The aim of the study was to estimate the effects of cannabis and alcohol on: (i) the probability of being sexually active; and (ii) the probability of having sex without contraception. The study was based on data from the National Longitudinal Study of Adolescent Health. Respondents were asked about cannabis use in the past 30 days and if they had been drunk or drunk until 'very high' in the past 12 months. Respondents were also asked if they had ever had intercourse, what month and year they last had intercourse, and whether they used contraception at last intercourse.	Total sample included 16,677 US students aged 11-21 years.	Drinking until 'very high' was associated with a 0.082 increase in the probability that males had sex without contraception, and a 0.110 increase in the probability that females had sex without contraception. The authors stated that their results suggest that the link between substance use and sexual behaviour may not reflect causation.
Sabel et al, 2004	The study examined the associations between self-reported drinking and driving, or being a passenger of a drinking driver based on data from the Youth Risk Behavior Survey. Driving after drinking was defined as reporting driving a car or other vehicle after using alcohol, within the past 30 days. Being a passenger of a drinking driver was defined as reporting having ridden in a car or other vehicle after the driver had been using alcohol, but not driving after drinking, within the past 30 days. Individual risk factors were: quantity (high defined as ≥5 drinks per occasion) and frequency (high defined as ≥3 drinking days per month) of drinking; rarely or never using a seatbelt; smoking, cannabis and/or cocaine use; and, carrying a gun in the previous month.	2,955 US high school students in Grades 9-12 were surveyed.	High quantity (≥5 drinks per occasion) and frequency (≥3 drinking days per month) drinking were associated with driving after drinking and riding with a drinking driver. High quantity drinking Passenger only: AOR 2.6 (95% CI: 1.9, 3.6) Drinking driver: AOR 6.6 (95% CI: 3.3, 13.2) High frequency drinking Passenger only: AOR 1.9 (95% CI: 1.4, 2.5) Drinking driver: AOR 5.1 (95% CI: 2.4, 10.7)

Study ID	Methods	Participants	Results
Sen, 2002	Data collected as part of the US National Longitudinal Study of Youth 1997. Respondents asked about consumption of alcohol in past 30 days, binge drinking, sexual intercourse in past 12 months and contraceptive use.	8,984 respondents aged 12-16 years.	The results indicated a strong association between alcohol use and sexual activity. Alcohol use was associated with 20-27% (20-37%) increase in the probability of sexual intercourse and an 11-16% (10-17%) increase in the probability of non-contracepted intercourse for adolescent girls (boys in brackets). Heavy drinking (i.e. five or more drinks on one occasion) had a weak association with sexual intercourse.
Shepherd et al, 2006	The aim of the study was to determine whether there is a significant relationship between vulnerability to physical violence and alcohol consumption in adolescence, independent of a relationship between alcohol consumption and violent behaviour. Respondents were asked how often they drank alcohol and were involved in fights. They were also asked about how often within the past year that they had been drunk, hit someone, or been hit by someone.	4,187 adolescents aged 11-16 years.	There were strong relationships between frequent fighting and alcohol consumption frequency ($p<0.001$) and frequency of drunkenness in the past year ($p<0.0001$). There were also strong relationships between the frequency of having hit others and being hit by others in relation to alcohol consumption and frequency (both $p<0.0001$). Results of a logistic regression analysis showed a direct relationship between alcohol consumption and drunkenness and vulnerability to being hit. Those who reported alcohol consumption or drunkenness were more likely to have been hit three or more times in the past year (alcohol: OR 2.25, 95% CI: 1.34, 3.77; drunkenness: OR 2.99; 95% CI: 1.92, 4.65). There was a statistically significant association between alcohol consumption and drunkenness, fighting, hitting others and being hit. OR 95% CI Drinking frequency Fighting 2.38 2.04, 2.76 Hitting others 6.89 5.00, 9.49 Being hit 2.94 2.19, 3.95 Drunkenness frequency Fighting 2.10 1.84, 2.41 Hitting others 6.62 5.35, 8.19 Being hit 4.01 3.17, 5.08

Study ID	Methods	Participants	Results
Swahn & Donovan, 2005	The study examined demographic and psychosocial factors to determine the predictors of fighting attributed to alcohol use among adolescent drinkers. Data were collected as part of the National Longitudinal Study of Adolescent Health. Alcohol consumption and problems measured included usual drinking quantity, drinking frequency, high-volume drinking (5+ drinks), unsupervised drinking, problem drinking, drinking alone, peer alcohol use, and drug or alcohol abuse treatment. Fighting attributed to alcohol use was assessed by asking participants how often in the past 12 months they had got into a physical fight because they had been drinking (never, once, twice, 3-4 times, 5 or more times). A logistic regression model was constructed using a backward elimination procedure to identify the significant predictors of initiating fighting attributed to alcohol use at follow-up.	Analyses limited to 5,230 students (age 12-21 years) who participated in baseline and follow-up interviews and who reported current drinking.	The following variables were significant predictors of the initiation of fighting attributed to alcohol use: drinking more than 9 days/months (OR 2.22; 95% CI: 1.20, 4.10); any high volume drinking (OR 2.61; 95% CI: 1.72, 3.96); trouble in school (OR 1.69; 95% CI: 1.10, 2.58); low college expectations (OR 1.61; 95% CI: 1.05, 2.47); and involvement in weekly sports activities (OR 2.07; 95% CI: 1.33, 3.22). Subgroups of adolescents who reported trouble in school and who had low expectations of going to college were also more likely to report the onset of fighting attributed to alcohol use. Having trouble in school significantly increased the likelihood of initiating fighting attributed to alcohol use for adolescents age 15 to 16 years but not for younger or older adolescents. Low college expectations were a significant predictor of the initiation of fighting attributed to alcohol use for males but not for females.

Study ID	Methods	Participants	Results
Swahn et al, 2004	Data collected as part of the National Longitudinal Study of Adolescent Health. Six measures of alcohol consumption and alcohol problems included: frequency of drinking, binge drinking, unsupervised drinking, drinking alone, peer drinking, and problem drinking. In addition, three outcome measures of violence and injuries were included. All measures were based on incidences in the past 12 months.	8,885 adolescents who reported consuming at least one alcoholic drink in the past year.	Fully adjusted multivariate logistic regression models with all alcohol variables included showed that adolescent drinkers who reported frequent drinking, binge drinking, problem drinking or peer drinking were more likely to be involved in all three violence and injury outcomes (fighting in past 12 months, injured in fight in past 12 months, injured others in past 12 months) than drinkers who did not report these patterns (see below). Drinking frequency 2-8 days/month Fighting (past year): OR 1.02 (0.84, 1.22) Injured in a fight (past year): OR 0.87 (0.64, 1.18) Injured others (past year): OR 1.07 (0.89, 1.29) Drinking frequency 9-30 days/month Fighting (past year): OR 1.41 (1.05, 1.87) Injured in a fight (past year): OR 1.96 (1.31, 2.95) Injured others (past year): OR 1.55 (1.17, 2.04) Binge drinking 2-30 days/month Fighting (past year): OR 1.35 (1.12, 1.62) Injured in a fight (past year): OR 1.85 (1.35, 2.54) Injured others (past year): OR 1.32 (1.06, 1.65)

Study ID	Methods	Participants	Results
Wells et al, 2005	The main objectives of the study were to determine the roles of heavy drinking, drinking frequency and drinking volume in explaining alcohol-related aggression and whether drinking context modified these relationships or predicted alcohol-related aggression independently. The study was based on young adult data from the National Longitudinal Study of Youth. Respondents were asked how often they had 'gotten into an argument or fight' during or after drinking in the previous 12 months. Three alcohol consumption variables were used: heavy episodic drinking, drinking frequency and drinking volume. Three drinking context variables were used: usual drinking location, typical drinking companions and peer drinking.	375 males and 363 females aged 17-21 years.	In adjusted multiple logistic regression models, drinking frequency (males: OR 1.31; 95% CI: 1.07, 1.60; females: OR 1.34; 95% CI: 1.08, 1.65), but not heavy episodic drinking (males: OR 0.94; 95% CI: 0.44, 2.04; females: OR 1.89; 95% CI: 0.87, 4.13) or drinking volume (males: OR 1.00; 95% CI: 1.00, 1.01; females: OR 1.01; 95% CI: 1.00, 1.02), was significantly associated with fights after drinking. Drinking frequency and volume were found to confound the relationship between heavy episodic drinking and fights after drinking. There was a strong positive association between drinking frequency and fights after drinking for those who reported drinking in public locations away from home ($p<0.0001$) but a much weaker association was found between fights after drinking for those who reported drinking in private locations ($p=0.0013$).
Wells et al, 2006	The study examined whether predisposing and family background characteristics confounded or modified the association between drinking frequency and alcohol-related aggression based on analysis of data from the NLSY. Measures were the same as those collected in Wells et al, 2005. Predisposing characteristics included age started drinking, the Behavior Problem Index, other aggressive behaviour and risk taking.	301 males and 301 females aged 17-21 years.	Drinking frequency was found to be a significant explanatory variable for fights after drinking after controlling for demographic, family background, and predisposing characteristics for both males and females (males: OR 1.30; 95% CI: 1.06, 1.60; females: OR 1.42; 95% CI: 1.15, 1.76). The authors did not find any evidence that predisposing and family background characteristics confounded the relationship between drinking frequency and fights after drinking.

Study ID	Methods	Participants	Results
Zador et al, 2000	The objective of the study was to re-examine and refine estimates for alcohol-related relative risk of driver involvement in fatal crashes by age and gender as a function of blood alcohol concentration. Logistic regression was used to estimate age/gender-specific relative risk estimates of fatal crash involvement for single vehicle crashes and all fatal crashes.	Based on data from 48 states that participated in the 1996 Roadside Survey.	The relative risk of a fatal injury in a single vehicle crash decreased with age. Among 16-20-year-old male drivers a BAC increase of 0.02% was estimated to more than double the relative risk of a fatal single vehicle crash. Even at a low positive BAC (10-19mg/100ml) the relative risk of a fatal injury from a single vehicle crash increased by 55% among males and 35% among females.

Table 5: Longer-term consequences of adolescent alcohol consumption

Study ID	Methods	Participants	Results
Bonomo et al, 2004	The aim of the study was to determine whether adolescent alcohol use and/or other adolescent health risk behaviour predispose individuals to alcohol dependence in young adulthood. Alcohol dependence was assessed according to DSM-IV alcohol dependence criteria in those participants who reported using alcohol at least three times a week (frequent users). Based on self-reported alcohol consumption, participants were classified as either: (1) a frequent drinker (drinking on 3 or more days in previous week); or (2) a binge drinker [consuming 45g of alcohol or more (equivalent to 5+ standard drinks)].	Seven-wave cohort study conducted in Victoria, Australia between 1992 and 1998. A total of 1,943 adolescents participated at least once during waves 1-6 and 1,601 young adults provided data at wave 7 (age 20-21 years).	Of the 1,601 participants, 1,374 had consumed alcohol in the previous year and 124 were classified as frequent drinkers. A total of 68 participants (55% of frequent drinkers) fulfilled DSM-IV alcohol dependence; 96% (CI: 93%, 98%) reported drinking during the adolescent phase. Frequent drinking and binge drinking each showed strong associations with alcohol dependence in young adulthood. Participants who reported recurrent frequent drinking had increased odds for later dependence [OR 8.1 (95% CI: 4.2, 16)], as did those who reported recurrent binge drinking [OR 6.7 (95% CI: 3.6, 12)]. Multiple logistic regression showed that the relationship between alcohol dependence in young adulthood and frequent teenage drinking was independent. The likelihood of alcohol dependence increased with persistence of frequent drinking through adolescence [OR for frequent drinking at one wave: 2.0 (95% CI: 1.0, 4.3); OR for frequent drinking at multiple waves: 3.1 (95% CI: 1.2, 7.7)].

Study ID	Methods	Participants	Results
Chassin et al, 2002	The study examined binge drinking trajectories from adolescence to emerging adulthood. The frequency of consuming five drinks in a row in the past year was used to create binge drinking trajectories: (i) 'early-heavy', early onset of binge drinking at age 13-14 years and high level of binge drinking; (ii) 'late-moderate', later onset of binge drinking and lower level (<monthly); and (iii) 'infrequent', early age of onset but binge drinking did not escalate in frequency.	238 children of alcoholics and 208 controls.	The early-heavy group had the greatest risk of a diagnosis of alcohol abuse or dependence, and the infrequent and late-moderate groups were at higher risk than the non-bingers (all $p<0.05$). The effects of drinking trajectory group was larger for males than for females. Those who were in any of the binge-drinking trajectory groups were more likely than non-bingers to be diagnosed with drug abuse and dependence. There was no significant effect of drinking group on predicting depression diagnoses or anxiety disorders. Participants in the non-binger group were more likely to be in college full time than those in any of the other groups (all $p<0.01$).

Study ID	Methods	Participants	Results
Chatterji, 2006	The study used data from the 2000 National Education Longitudinal Study to estimate the association between high school alcohol use and educational attainment measured around age 26. The analysis used the following two alcohol use indicators, measured in both 10th and 12th grade: (1) respondent drank at least once in the past month; and (2) respondent had five or more drinks in a row at least once in the past 2 weeks.	4,126 females and 3,478 males.	The models developed showed evidence of a robust, negative association between 10th grade drinking and educational attainment around age 26. Among boys, any past month alcohol use was associated with a 2 percentage point reduction in the probability of graduating on schedule, a 7 percentage point reduction in the probability of entering college, and a 5 percentage point reduction in graduating from college. The results were similar for binge drinking in 10th grade among boys. Girls who used alcohol in 10th grade had a 4 percentage point reduction in entering college compared to girls who did not use alcohol in 10th grade. Binge drinking among girls detracts from college graduation, but there was no statistically significant association between any alcohol use in the past month and college graduation among girls. Among girls, most associations between 12th grade drinking and educational attainment were not statistically significant. However, among boys, any alcohol use in 12th grade was associated with a 7 percentage point reduction in college entrance and binge drinking was associated with a 9 percentage point reduction in college entrance. Based on the results of the bivariate probit model, the authors suggest that the observed association between alcohol use and educational attainment is not robust to moderate degrees of negative correlation between the unobserved determinants of both outcomes. Therefore the authors concluded that although the results suggest that alcohol use is associated with reductions in educational attainment, there is little evidence that this association represents a causal relationship.

Study ID	Methods	Participants	Results
Hill et al, 2000	The study sought to understand the patterns of binge drinking in adolescence, and the consequences of these patterns on social functioning, criminal behaviour, and mental health in the transition to adulthood. The authors used prospective data from the Seattle Social Development Research Project. Binge drinking was defined as drinking at least 5 drinks in a row in the last month. The authors grouped participants into four trajectory groups: non-bingers; early highs; increasers; and late onsetters.	808 children and their families. Participants were followed up annually from age 11 up to age 21.	Binge drinking patterns in adolescence significantly predicted crime, alcohol abuse/dependence, drug abuse/dependence, high school completion, involvement in clubs/activities and parental bonding at age 21. After controlling for confounders, early highs were not more likely than non-bingers to be depressed, involved in crime, or alcohol- or drug-dependent at age 21, but were less likely to complete high school, be involved in clubs and activities and be bonded to their parents at age 21. Increasers had the highest likelihood of alcohol abuse or dependence at age 21. However, it was adolescent drug abuse in this group that predicted negative outcomes other than alcohol abuse and dependence at age 21. Late onsetters were more likely than non-bingers to be alcohol and drug dependent and were less likely to complete high school.

Study ID	Methods	Participants	Results
Jefferis et al, 2005	The study assessed (i) continuities in binge drinking across adulthood and (ii) the association between adolescent drinking level and adult binge drinking. Binge drinkers were identified by dividing the number of units of alcohol consumed in the past week by usual frequency. The analyses used limits of ≥10 units per occasion for men and ≥7 units for women.	The study used the 1958 British birth cohort (a population based prospective cohort). Data were used from follow-up at ages 16, 23, 33 and 42 years. At 42 years, 11,419 participants responded to the survey.	At 16 years, 52% of male and 40% of female participants reported drinking in the past week. A further 19% and 18%, respectively, reported use in the last month. Binge drinking was common throughout adulthood, the peak was at 23 years, 37% of men and 18% of women followed by a decline at later ages. Continuity of binge drinking: 60% of men and 36% of women were binge drinkers on at least one time point, although for the majority it was only one rather than repeated time points. Eight per cent of men and 1% of women were binge drinkers at all three adult time points. Men who binge drank at 23 were 2.10 (95% CI: 1.85, 2.39) times more likely to binge drink at 42 years than non-binge drinkers at 23. Similarly for women, binge drinkers at 23 years had an increased odds ratio for 42 years of 1.56 (95% CI: 1.29, 1.89). Association between drinking behaviour at 16 with binge drinking at 23, 33 and 42 years: among women who rarely or never drank as teenagers, ORs were below 1, suggesting that they are less likely than light drinkers (0-2 units) to binge drink in adulthood. Male light drinkers were no more likely than non-drinkers to binge drink as adults. Drinking 3-6 units in the past week at 16 years compared to 0-2 units increased the odds of adult binge drinking at each adult age in men and at 33 and 42 years in women. The heaviest drinkers at 16 years (7 units or more) had significantly elevated ORs for binge drinking at each age in adulthood for men and at 42 years for women. Further analysis showed that the effect of adolescent drinking on binge drinking was similar across ages 23, 33 and 42 for men, whereas for women there was a significant difference: there was a stronger effect of adolescent drinking on adult binge drinking at age 42 than at ages 23 or 33.

Study ID	Methods	Participants	Results
McCarty et al, 2004	The aim of the study was to test the hypothesis that late adolescent drinking behaviour is associated with harmful and binge drinking in early adulthood. The definition of harmful drinking was >4 standard drinks per day for men and >2 standard drinks per day for women, based on drinking in past month. Binge drinking was defined as 6 or more drinks on at least one occasion in the last month for both men and women.	Data for the study were taken from the National Longitudinal Survey of Youth 1979. The sample for the analysis of harmful drinking consisted of data on 3,790 participants reporting at least one survey measurement of harmful drinking status between ages 17-20 years and again between ages 30-31 years. The sample for the analysis of binge drinking was a subset of the first and included 2,387 participants who reported at least one survey measurement of binge drinking between ages 17-20 and 30-31.	Twelve per cent of male and 9% of female participants reported harmful drinking between ages 17 and 20. This decreased to 5% for men and 7% for women at ages 30-31 years. A proportion of harmful drinkers at ages 17-20 were also harmful drinkers at ages 30-31 [14.3% (95% CI: 8.5%, 20.0%) of men and 13.7% (95% CI: 6.9%, 20.6%) of women]. Males were more likely to binge drink at both age periods than females. A much larger proportion of participants qualified as binge drinkers (73% of men and 48% of women at ages 18-20). The prevalence of binge drinking at ages 30-31 was 42% for men and 20% for females. Among those who were binge drinkers at ages 17-20, 50% of men and 33% of women were also binge drinkers at ages 30-31. For non-binge drinkers at ages 17-20, 20% of male and 8% of female participants were binge drinkers at ages 30-31. Harmful drinking at ages 17-20 was associated with an increased RR of harmful drinking at ages 30-31 for men [RR 2.71 (95% CI: 1.63, 4.48)], but did not reach significance for women [RR 1.43 (95% CI: 0.83, 2.46)]. Binge drinking increased the RR of binge drinking at ages 30-31 for both men [RR 2.34 (95% CI: 1.81, 3.04)] and women [RR 3.38 (95% CI: 2.38, 4.78)].

Study ID	Methods	Participants	Results
Patton et al, 2007	The study used data from a cohort of almost 2,000 adolescents followed from adolescence to young adulthood to examine the following questions: 1) To what extent do individuals report potentially harmful use of alcohol and/or cannabis during adolescence and young adulthood? 2) To what extent does heavier adolescent use of alcohol and/or cannabis predict substance use in young adulthood? 3) To what extent does heavier adolescent use of alcohol and/or cannabis predict different social circumstances in young adulthood? Alcohol use was assessed using self-reported frequency of use and a retrospective 1-week alcohol diary (beverage- and quantity-specific) for those reporting alcohol use in the previous week. High-risk drinking was defined as exceeding 43 standard drinks in males and 28 standard drinks in females. Cannabis use was assessed using self-reported frequency of use in the previous 6 months and 12 months.	1,943 Australian students aged 14-15 years.	Cannabis and alcohol use were associated at all levels of risk, but the strength of association declined as the cohort aged, reflecting the increasing prevalence of cannabis and alcohol use at each level. Concurrent high-risk level alcohol and cannabis use was consistently low throughout the study. Adolescent moderate-risk cannabis use predicted a sevenfold higher rate of high-risk cannabis use in young adulthood (OR 7.4; 95% CI: 3.3, 17) but only a twofold elevation in later high-risk alcohol use (OR 2.2; 95% CI: 1.1, 4.5). Adolescent moderate-risk alcohol use independently predicted a threefold higher rate of later high-risk alcohol use (OR 3.0; 95% CI: 1.5, 6.0), a similar level of association to that with later high-risk cannabis use. There was no evidence of effect modification by gender. Cross-sectional associations: high-risk alcohol users were more likely to use other substances (used amphetamines: OR 3.5; 95% CI: 2.2, 5.4; used ecstasy: OR 2.9; 95% CI: 2.0, 4.2; used cocaine: OR 2.9; 95% CI: 1.7, 5.0) , but with the exception of relationship status (not in a relationship: OR 1.6; 95% CI: 1.2, 2.3), their social circumstances and help-seeking did not differ from those without a history of high-risk substance use. Predictive associations: adolescent moderate-risk alcohol users were at elevated risk for later daily cigarette smoking (OR 2.0; 95% CI: 1.3, 3.1), ecstasy (OR 2.0; 95% CI: 1.1, 3.6) and cocaine use (OR 2.4; 95% CI: 1.2, 4.7), but with the exception of higher rates of parenthood in females (OR 2.5; 95% CI: 1.2, 5.2), this group appeared similar in their later social context to non-risk substance-using adolescents.

Study ID	Methods	Participants	Results
Renna, 2007	The study analysed the effect that binge drinking has on the probability of graduating on time from high school and on future earnings based on data from the National Longitudinal Survey of Youth 1979.	12,686 participants between the ages of 14 and 21 years.	Heavy drinking decreased the probability of graduating on time. Binge drinking did not have a direct impact on adults' earnings, but graduating late resulted in lower income. The authors estimated that because of late graduation, young men who binge in high school will face an earnings penalty of 1.5 to 1.84 percentage points. They also found that women faced a penalty, but that this seemed mostly due to the fact that women who graduate late work in industries and occupations that pay less.
Viner & Taylor, 2007	The aim of the study was to determine outcomes in adult life of binge drinking in adolescence based on data from the 1970 British Birth Cohort Study. Questions included usual frequency of drinking alcohol in the past 12 months, units of alcohol consumed in the previous week and frequency of consuming four or more drinks in a row in the previous 2 weeks. Adolescent binge drinking was defined as two or more episodes of consuming four or more drinks in a row in the previous 2 weeks.	4,911 participants for whom data on alcohol consumption were available at age 16 and were followed up at age 30.	Frequent binge drinking predicted a higher risk of adult alcohol dependency, weekly alcohol consumption, greater than recommended levels of alcohol consumption, convictions and a history of exclusion from school and leaving school without any qualifications as well as a history of significant accidents, independently of adolescent habitual frequency of alcohol consumption.

Study ID	Methods	Participants	Results
Wells et al, 2004	The aim of the study was to describe the pattern of drinking at age 16 and to relate this to a range of psychosocial outcomes at 16-21 years and 21-25 years. Data collected during the course of the Christchurch Health and Development Study, a longitudinal study of 1,265 children born in mid-1977. Outcomes were measured across six domains of functioning: (1) alcohol-related outcomes; (2) substance dependence; (3) mental health; (4) education and employment; (5) sexual relationships; and (6) offending.	Prospective birth cohort study with annual follow-up until age 16 and then at 18, 21 and 25 years. A total of 953 respondents were included in the analyses.	Four latent classes were required to describe drinking at age 16. Examination of these patterns showed a progression across the classes from those in class 1 who had not consumed any alcohol in the past 3 months (24%) through to alcohol abusers in latent class 4 who drank often, consumed large amounts and reported a number of alcohol-related problems (9%). After controlling for background and correlates, outcomes consistently related to drinking at age 16 over both periods (16-21 years and 21-25 years) were: drinking at least weekly (21: p=0.001; 25: p=0.02); amount per last occasion in the past 12 months (21: p<0.0001; 25: p=0.04); largest amount on a single occasion in the past 12 months (21: p<0.0001; 25: p=0.0006); the number of sexual partners (16-21: p<0.0001; 21-25: p=0.007); and the number of violent offences (16-21: p = 0.004; 21-25: p=0.03). Alcohol dependence was predicted by drinking at age 16 for the 16-21 age period (p=0.003) but not the 21-25 period (p=0.51) when all covariates were included.

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