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# **Teenage locus of control, psychological distress, educational qualifications and occupational prestige as well as sex are independent predictors of adult binge drinking**

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## **Abstract**

Our objective was to investigate various psychological and socio-demographic factors in childhood and adulthood that relate to alcohol intake and binge drinking at age 42 years. Data were drawn from the 1970 British Cohort Study (BCS70), a prospective longitudinal study monitoring the development of babies born in the in 1970 with nine follow-ups. The analytic sample comprised 5267 cohort members with data on parental social class at birth, cognitive ability at age 10, locus of control at age 16, psychological distress at age 30, educational qualifications at age 34, and current occupation and alcohol consumption at age 42 years. Results showed that sex (male), lower parental social class, adolescent external locus of control, psychological distress, lower scores on childhood intelligence, lower educational qualifications and less professional occupations were all significantly and positively associated with binge drinking in adulthood. Hierarchical logistic regression analyses showed that sex (OR=0.52, CI: 0.44-0.60,  $p<.001$ ), parental social class (OR=0.67, CI: 0.50-0.92 to OR=0.49, CI: 0.31-0.57,  $p<.05$  to  $p<.01$ ), locus of control beliefs (OR=0.90, CI: 0.84-0.96,  $p<.01$ ) adult psychological distress (OR=1.28, CI: 1.04-1.58,  $p<.05$ ), educational qualifications (OR=0.70, CI: 0.53-0.92 to OR=0.39, CI: 0.25-0.61,  $p<.05$  to  $p<.001$ ) and occupational levels (OR=0.59, CI: 0.38-0.95 to OR=0.36, CI: 0.20-0.65,  $p<.05$  to  $p<.01$ ) were significant and independent predictors of adult binge drinking. Both psychological and social factors influence adult excessive alcohol consumption. Adolescent locus of control beliefs had a modest but significant effect on adult binge drinking 26 years later.

## **Introduction**

Although there is a debate about whether moderate alcohol consumption has some beneficial effect on health outcomes such as heart conditions and stroke (e.g., Berger et al., 1999; Rimm, Klatsky, Grobbee, & Stampfer, 1996; Ronksley, Brien, Turner, Mukamal, & Ghali, 2011; Topiwala, Allan, Valkanova, Zsoldos, Filippini, Sexton, . . . Ebmeier, 2017), excessive alcohol consumption has been unequivocally linked to many mental and physical health problems such as depression (Blow, Serras & Barry, 2007; Boden, & Fergusson; 2011), liver disease (Gao & Bataller, 2011), and mortality (Klatsky, Armstrong & Friedman, 1992; Sjölund, Hemmingsson, Gustafsson, & Allebeck, 2015). Further, based on a sample of 19,002 alcohol-dependent individuals and 186,767 controls, Holst, Tolstrup, Sørensen, and Becker (2017) found that alcohol-dependent men and women have significantly higher risks of a comprehensive spectrum of somatic diseases, both as disease events and as causes of death, relative to individuals from the general population (Holst, et al., 2017).

Using data from the Centers for Disease Control and Prevention's Alcohol-Related Disease for 2006–2010 in the United States, Stahre, Roeber, Kanny, Brewer, and Zhang (2014) reported that from 2006 through 2010, excessive alcohol consumption (including binge drinking) is the fourth leading preventable cause of death in the United States, with the rate of annual average of 27.9 per 100,000 population of the alcohol-attributable deaths (AAD) occurred (of which, binge drinking is responsible for over half of deaths and three-quarters of the economic costs). It was estimated that overall, 44% of the AAD were due to chronic conditions, and 56% of the AAD were caused by acute conditions, and most AAD (71%) involved males (Stahre, et al., 2014). In the UK, for males in 2015 the alcohol-related death rate was 19.2 per 100,000 males whereas for females it was 9.7 per 100,000 females. This pattern is observed consistently each year from 1994 to 2015 (ONS, 2015).

Binge drinking, is drinking a *large* quantity of alcohol in a *short* period of time, usually with the specific aim of getting drunk (NHS, 2014). It is acute (rather than chronic) consumption. Binge drinking is also defined as  $\geq 5$  drinks on an occasion for men and  $\geq 4$  drinks on an occasion for women in the United States (Stahre, et al., 2014), or drinking five or more units of alcohol on a typical day for both men and women (Brown & Hancock, 2014; Hancock & Brown, 2014). Binge drinking usually results in acute intoxication (Stahre, et al., 2014), it is also associated with motor-vehicle accidents and irresponsible sexual practices particularly in young people (Furnham, 2003).

A recent report from the General Lifestyle Survey Overview (ONS, 2013) shows that there were gender differences that the proportion of adults who exceeded 4/3 units of alcohol on at least one day during the previous week was higher for men (34%) than it was for women (28%). Similarly, the proportion drinking heavily (8 units – 12 units) was also greater for men (18%) than for women (12%). There were also age differences that those aged 65 and over were significantly less likely than respondents in other age groups to have exceeded 4/3 units of alcohol on at least one day in the last week with 20% of men over 65 years, for the younger three age groups were 32%, 39% and 38% (16 to 24, 25 to 44 and 45 to 64 respectively) among men. Among women, 12% of those aged 65 and over exceeded three units on at least one day in last week and 31 %, 34% and 33% of the younger three age groups (16 to 24, 25 to 44 and 45 to 64 respectively) did so (ONS, 2013). Drinking was related to marital (and employment status, to ethnicity, religion as well as gender (Furnham, 2010).

Baer (2002) highlighted four factors commonly associated with students heavy drinking: *Family history and parents' behaviour* (Genetics, parents drinking and parenting skills and style have all been associated with young people drinking); *Personality* (Three traits have been consistently investigated – impulsivity/disinhibition; extraversion/socialability; and neuroticism/emotionality); *Drinking motives, alcohol expectancies and perceived norms*. (Drinking for emotional escape and relief as opposed to social purposes has been shown to be unhealthy. Expectations of what alcohol does to the self and others is also implicated in unhealthy drinking as are perceived social norms) *Social Affiliation* (This is reasoned to be the most important factor and refers to drinking activities, games and general practices) (Baer, 2002).

#### *Locus of control and alcohol consumption*

There is a vast academic literature on the locus of control concept. Rotter (1966) defined locus of control (LOC) as: “When a reinforcement is perceived by the subject as not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way by an individual, we have labelled this as a belief in *external control*. If the person perceives that the event is contingent upon his own behaviour or his own relatively permanent characteristics, we have termed this a belief in *internal control*” (p. 1).

Locus of control beliefs are found to be associated with health, education, and relationships. For example, in a review Wallston and Wallston (1978) found that internal locus of control is associated with maintaining a diet and giving up smoking; Abouserie (1994) found that individuals with external locus of control feel more helpless, anxious and stressed compared to

those with internal locus of control; Findley and Cooper (1983), in a review, found that more internal beliefs are associated with greater academic achievement; and Camp and Ganong (1997) found that internal locus of control beliefs are associated with long-term marital satisfaction. It suggests that fatalism (external beliefs) are in many ways maladaptive, while instrumental beliefs (internal beliefs) adaptive. The central idea is that believing in personal control and self-efficacy leads people to take responsibility for all aspects of their lives, which has many beneficial consequences (Rotter, 1966).

A number of studies have looked at the relationship between locus of control and alcohol use and treatment (e.g., Cox & Luhrs, 1978; Canton, Giannini, Magni, Bertinaria, Cibin, & Gallimberti, 1988; Marchiori, Loschi, Marconi, Mioni & Pavan, 1999; Naditch, 1975). The results of these studies are relatively consistent, suggesting that external locus of control is associated with various aspects of unhealthy drinking: drinking under-age, excessive alcohol consumption, and less favourable outcome in patients with pre-treatment scores indicating external locus of control than in those with internal locus of control. However, the sample sizes in these studies are relatively small, e.g., male patients only with a sample size of n=67 (Canton, et al., 1988). Moreover, no study seems to look at the association between locus of control and binge drinking, especially in recent years. Whilst there is evidence that the beliefs can be changed, our focus of this study is whether, and to what extent, that fatalistic views in adolescence relate to adult binge-drinking over 25 years later.

#### *Depression/anxiety/malaise and alcohol consumption*

Various studies have examined the link between depression and alcoholism. In a systematic review, Boden and Fergusson (2011) examine the literature on the associations between alcohol use disorders (AUD) and major depression (MD). They found that the presence of either

disorder doubled the risks of the second disorder, with pooled adjusted odds ratios ranging from 2.00 to 2.09.

A meta-analysis was conducted by Conner, Piquart, and Gamble (2009) on 74 studies: 58 reports from clinical venues, 10 were community based, and 6 with subjects from both settings. They found that depression is associated with concurrent alcohol use and impairment and drug use. Depression was also related to future alcohol use and impairment, and earlier age of onset of alcohol use disorder. Moreover, the association was stronger in older samples.

In another study, using a large sample of 7195 individuals aged 15–64, based on lifetime diagnoses, Gratzner et al. (2004) compared rates of alcohol abuse/dependence in four groups consisting of normal controls, individuals with unipolar major depression but no anxiety disorders, individuals with one or more anxiety disorders without depression, and individuals with co-morbid major depression and anxiety. Results of the study revealed that in both genders, there were significantly higher rates of alcoholism in all three psychiatric groups relative to controls. In females only, there was also a significantly higher rate of alcoholism in the depressed/anxious group than in the pure anxious group.

In this study we used a measure of malaise, less used in the alcohol research area, the Rutter Malaise Inventory (Rutter, Tizard, & Whitmore, 1970). The content includes major psychological disorders and physical exhaustion. Rutter, Tizard and Whitmore (1970) affirms that 'the inventory differentiates moderately well between individuals with and without psychiatric disorder' (p.160). It has both state and trait features and may be considered a measure of minor psychiatric morbidity. Recent research has demonstrated that it is fairly stable over time (Furnham & Cheng, 2015). In the current study we investigated the

relationship between malaise/psychological distress at aged 34 years and alcohol consumption 8 years later.

#### *Locus of control and depression/anxiety*

Many studies have demonstrated the fact that fatalists are more likely to be depressed (Nolen-Hoeksema, Larson, & Grayson, 1999). The data suggests that the relationship is significant across different measures of both variables, over different age and culture groups and across time. In a study using the same data of BCS70, Gale, Batty, David and Deary (2008) found that locus of control measured at age 10 was significantly associated with psychological distress at age 30 years. In the current study we examined the relationship between locus of control measured at age 16 years and psychological distress (malaise) measured at age 34 years. Given the relative stability of malaise found in Furnham and Cheng study (2015), we assume that these two variables would be significantly correlated, and that both variables would be related to alcohol consumption.

#### *Intelligence and alcohol consumption*

The association between intelligence and alcohol consumption has been examined in various studies. Using the BCS70, Batty et al. (2008) found that higher childhood intelligence measured at age 10 was positively associated with the higher alcohol intake in adulthood measured at age 30 years. The same finding was obtained by Kanazawa and Hellberg (2010), using another data, the National Child Development Study (NCDS) in the UK. They argue that more intelligent individuals may be more likely to acquire and espouse evolutionarily novel values than less intelligent individuals, such as consumption of alcohol, tobacco, and drugs. Using the NCDS data, Cheng and Furnham (2013) found that although childhood intelligence was significantly and positively associated with the frequency of alcohol consumption ( $r=.152$ ,



$p < .001$ ) measured at age 50 years, as found in Kanazawa and Hellberg (2010) study for the same question (“How often do you usually have an alcoholic drink of any kind?” 0=never, 1=only on special occasions, 2=less often than once a week, 3=once or twice a week, 4=most days) with a latent variable of the frequency of alcohol consumption measured at ages 23, 33, and 42 years; childhood intelligence, however, was significantly but negatively associated with binge drinking (the number of alcoholic drinks cohort member has in a typical day, with 0=0-4 units, 1=5 or more units) measured at age 50 years. They found that the correlation coefficient between binge drinking and childhood intelligence was  $r = -.121$  ( $p < .001$ ). In the following logistic regression, the odds ratio between childhood intelligence and binge drinking was  $OR = 0.76$  (95%  $CI = 0.70, 0.83$ ,  $p < .001$ ) when childhood factors were entered into the equation. One explanation for these different findings on the association between childhood intelligence and alcohol consumption could be the various types of alcohol consumption measures used in these studies.

Intelligence has also been linked to better health and lower rate of mortality (Leon, Lawlor, Clark, Batty & Macintyre, 2009). In this study we explore the relationship between childhood intelligence assessed at age 10 and alcohol consumption over 30 years later at age 42 years.

### *Education and alcohol use*

Like other behaviours, alcohol consumption can be influenced by education. There is an extensive literature which shows a clear link between education and alcohol consumption indicating that overall, the longer people spend in education and the more qualifications they obtain, the less hazardous behaviours, such as binge drinking, they are likely to have (Crum, Helzer & Anthony, 1993; Jefferis, Manor, & Power, 2007; Midanik & Room, 1992). Further,

as education is strongly related to social class there is a relationship between social class and patterns of alcohol consumption across many cultures (Furnham, 2003).

#### *Socioeconomic conditions and alcohol use*

There is also a link between socioeconomic conditions and alcohol use. In a cross-sectional study from a sample of 58, 282 respondents aged 18 years and over to four successive annual Welsh Health Surveys (2003/2004–2007), Fone, Farewell, White, Lyons, and Dunstan (2013) found that respondents in the most deprived neighbourhoods were more likely to binge drink than in the least deprived (17.5% vs 10.6%; 95% CI 6.0 to 7.8). In a meta-analysis based on 31 studies, Jones, Bates, McCoy, and Bellis (2015) examined the relationships between a range of alcohol-attributable conditions and socioeconomic indicators. They found that pooled analyses showed that low, relative to high socioeconomic status, was associated with an increased risk of head and neck cancer and stroke, as well as with hypertension and liver disease (Jones, et al., 2015).

#### *This study*

This study set out to investigate whether parental social class, locus of control at teen, childhood intelligence, psychological distress, (given the evidence shown above that these measures co-vary) are independently associated with unhealthy alcohol consumption/binge drinking, taking into account parental social class, gender, education and occupation, using a large prospective birth cohort in the UK.

Based on the previous studies in the area reviewed above, it was hypothesised 1) Internal locus of control measured at age 16 years is significantly and negatively associated with binge drinking in adulthood (at age 42 years); 2) Psychological distress (assessed at age 34 years) is

significantly and positively associated with binge drinking; 3) Childhood intelligence (assessed at age 10 years) is significantly and positively associated with the frequency of alcohol consumption but negatively associated with binge drinking at age 42 years; 4) Higher educational qualifications obtained at age 34 years is significantly and negatively associated with binge drinking at age 42 years; 5) Locus of control, psychological distress, childhood intelligence, and educational qualifications as well as sex are independent predictors of binge drinking in adulthood.

## **Method**

### *Sample*

The study draws on a nationally representative cohort study: the 1970 British Cohort Study (BCS70). The study participants were recruited as part of a perinatal mortality survey (BCS70 comprises 16,571 individuals who were born in Great Britain in a week in April 1970 (Elliott & Shepherd, 2006). At age 42 years 9,941 participants were interviewed and 8,586 participants provided information on their alcohol consumption (binge drinking and the frequency of alcohol use) (86.3% of the original cohort who were alive and living in the United Kingdom). The following analysis is based on data collected at birth, at age 10, age 16, age 34, and age 42 years. The analytic sample comprises 5,190 cohort members (50% females), for whom relevant data were collected from birth to the latest follow-up at age 42 years (60.4% of those who provided the information on their alcohol consumption). Analysis of response bias in the cohort data showed that the achieved adult samples did not differ from their target sample across a number of critical variables (social class, parental education and gender), despite a slight under-representation of the most disadvantaged groups (Plewis et al., 2004). Bias due to attrition of the sample during childhood has been shown to be minimal (Butler, Despotidou and Shepherd, 1997).

## *Measures*

1. *Family social background* includes information on parental social class and parental education. Parental social class at birth was measured by the Registrar General's measure of social class (RGSC). RGSC is defined according to occupational status (Marsh, 1986). Where the father was absent, the social class (RGSC) of the mother's father was used. RGSC was coded on a 6-point scale: I professional; II managerial/technical; IIIN skilled non-manual; IIIM skilled manual; IV semi-skilled; and V unskilled occupations (Leete & Fox, 1977). Parental education is measured by the age parents had left their full-time education.
2. *Childhood Intelligence* was assessed at age 10 in school using assessed in school, using a modified version of the British Ability Scales (BAS) which can serve as a measure for childhood IQ (Elliott, Murray and Pearson, 1978). The assessment involved the administration of four sub-scales: word definitions and word similarities which were used to measure verbal ability, and recall of digits and matrices which were used to measure non-verbal ability. For the word definitions subscale, the teacher articulated each of 37 words in turn and asked the child about its meaning. For each of the 42 items in the word similarities subscale, the teacher enunciated 3 words and asked the child to name another word consistent with the theme. For the 34 items subscale of recall of digits, the teacher read out digits at half-second intervals and asked the child to repeat them. For the 28 items matrices subscale, the teacher asked the child to draw in the missing part of an incomplete pattern. The four sub-scales were standardised and combined into a total scale. The alpha was 0.92 for the total scale. It was converted into IQ scores with mean=100 and SD=15 for the analysis.

3. *Locus of Control* was measured at age 16. Cohort members completed a 19-item Locus of Control Scale (Yes/No) (Gammage, 1975). The alpha was .72.
4. *Malaise Inventory* was assessed at age 30. It is a 9-item self-completion instrument, measuring depression, anxiety and psychosomatic illness (Rutter et al., 1970) and it correlates significantly with previously diagnosed and currently treated depression. The alpha was .81.
5. *Educational Qualifications* was assessed at age 34, participants were asked about their highest academic or vocational qualifications. Responses are coded to the six-point scale of National Vocational Qualifications levels (NVQ) which ranges from 'none' to 'university degree/higher'/equivalent NVQ 5 or 6.
6. *Occupation* was measured at age 42. Current or last occupation held by cohort members were coded according to the Registrar General's Classification of Occupations (RGSC), described above, using a 6-point classification mentioned above.
7. *Alcohol Use and Binge Drinking* were measured at age 42. Cohort members provided information on their amount of alcohol intake in the last 7 days (0=Never, 1=Monthly or less, 2=2-4 times per month, 3=2-3 times per week, 4=4+times per week). Binge drinking is defined as drinking five or more units of alcohol on a typical day with the question "How many units of alcohol do you drink on a typical day" (0=0-4 units, 1=5 or more units).

### *Statistical Analysis*

To investigate the set of psychological and socio-demographic factors in childhood and adulthood that relate to alcohol intake and binge drinking at age 42 years, first, the characteristics of the study population were examined; Second, correlation matrix of all examined variables in the study were presented; Third, three models were designed with binge

drinking at age 42 years as the dependent variable and binary logistic regression analyses were conducted using STATA version 14. Model 1 examined childhood factors in influencing binge drinking in adulthood; Model 2 examined the association between psychological factor in adulthood and binge drinking together with childhood factors in Model 1; and Model 3 examined the associations between social factors and the outcome variable taking account all other factors in Models 1 and 2.

## **Results**

### *Descriptive Analysis*

Table 1 shows the characteristics of the study participants according to the prevalence of binge drinking at 42 years. It shows that the prevalence of binge drinking was greater among cohort members who were from lower parental social background, had less education and less professional occupations. The prevalence of binge drinking was 18.3% at age 42 years. There were sex differences in binge drinking: men tended to have the greater prevalence on binge drinking than women (23.7% among men and 13.0% among women). Chi-square test showed that the sex differences on binge drinking were significant ( $\chi^2 (1), N=5190) = 98.68, p < .001$ ).

Inset Table 1 about here

### *Correlational Analysis*

Table 2 shows the correlations matrices and the means and SDs of all variables examined in the study. Binge drinking was significantly associated with parental social class, locus of control, childhood intelligence, psychological distress, educational and occupation as well as sex. Thus hypotheses 1) to 4) were supported.

Inset Table 2 about here

### *Regression Analysis*

Table 3 shows the results of binary logistic regression analyses using binge drinking as the dependent variable. In Model 1, when childhood factors were entered into the equation, higher parental social class (compared to the unskilled manual), higher scores on childhood intelligence, internal locus of control, and sex (female) were all significantly and negatively associated with binge drinking in adulthood. In Model 2, after adding psychological distress into the equation, all childhood factors remained significant, and psychological distress was significantly and positively associated with the outcome variable. In model 3, when all psychological, social and demographic factors examined in the study were entered into the equation, parental social class (from skilled manual to professional, relative to unskilled manual), internal locus of control, educational qualifications (from O level to university degree, compared to individuals with no qualifications), more professional occupations (managerial/technician and professional, compared to individuals with unskilled manual occupation), and sex (female) were significant and negative predictors of binge drinking. Childhood intelligence ceased to be a significant predictor of the outcome variable. Thus, hypothesis 5) was partially supported.

### **Discussion**

The current longitudinal study is among the first that looked at three psychological constructs, namely locus of control, childhood intelligence, and psychological distress, together with a set of social and demographic variables, to ascertain whether, and to what extent, each of these variables are independent predictors of binge drinking in adulthood.

The correlation matrix shows seven significant correlates of binge drinking: sex, parental social class, childhood intelligence, locus of control, psychological distress, education and occupation, six appear to be the independent predictors of the outcome variable.

This study confirms and extends the literature in the area. First, the large sex difference in binge drinking. Nearly all the studies, particularly with young people and students have indicated that the acuity and chronicity of binge is related to gender: males are much more likely to do it. There are various speculations as to why this is the case and whether indeed the pattern is changing with more young women taking part in binge drinking but the sex difference data seems to be consistent (Furnham, 2003, 2010; ONS, 2015; Stahre, et al., 2014). It seems that binge drinking is more acceptable for men and that there are more social opportunities afforded for them to participate in this behaviour.

This study, to the best of our knowledge, is the first that examined the association between locus of control and binge drinking (defined as drinking five or more units of alcohol on a typical day). It is interesting to note that locus of control measured at teen years had a significant effect on adult binge drinking 26 years later. Those with a more fatalistic external locus of control who believe that what happens to people with regard to health, happiness and success is determined by luck, chance or powerful others are more likely to take a “devil may care” attitude to their health which ignores warnings against binge drinking. The finding is in line with the previous studies in the area showing that internal locus of control is associated with a number of other health related behaviours such as weight control and smoking cessation Wallston and Wallston (1978).



Malaise or psychological distress seems to be a trait-like variable, which is stable over time and related to neuroticism and minor psychiatric morbidity. Furnham and Cheng (2015) showed in a correlational analysis that over 27 years malaise scores ranged from  $r=.41$  to  $r=.52$ , indicating the relative stability. In this study the effect of malaise/psychological distress at age 34 years on binge drinking at age 42 years with an odd ratio of  $OR=1.28$  ( $CI: 1.04-1.58, p<.05$ ) indicating that individuals who had higher scores on this measure would be 28% more likely to have binge drinking behaviour eight years later. The question of the process could in part be answered by this longitudinal data. It is self-evident that alcohol is a poor way of coping with anxiety, distress and depression probably increasing the latter rather than alleviating it. In this sense people may get into a negative vicious cycle where distress leads them to drink heavily and which in turn leads to more depression.

In term of the association between intelligence and alcohol consumption, it seems that childhood intelligence is significantly and negatively associated with binge drinking (consuming 5 or more drinks in a session or on a typical day) with  $r=-.089$  ( $p<.001$ ) and an odd ratio of  $OR=0.85$ ,  $CI: 0.79-0.91, p<.001$ ) when childhood factors and adulthood psychological factor were entered into the equation. It thus confirms the findings of Cheng and Furnham (2013) study, using another birth cohort from the UK; whereas childhood intelligence is significantly and positively associated with the frequency of alcohol consumption (the number of occasions on which alcohol is consumed in the last 12 months) with  $r=.158$  ( $p<.001$ ), confirming the findings reported by Batty, et al. (2008), Cheng and Furnham (2013), and Kanazawa and Hellberg (2010). It appears that intelligent individuals consume more alcohol, but they do so more sensibly than less intelligent individuals.

One question is the extent to which these results inform the treatment of binge drinking. The locus of control literature shows that it is possible to change locus of control beliefs, from more external to internal. Similarly, there is a vast literature on attempts to help those with anxiety, depression and malaise cope better with their distress. These results suggest the importance of early interventions to reduce the problems of binge-drinking in adulthood

Like all studies using cohort datasets, the present study is based on available variables in the dataset rather than being based on the study designed for the purpose, which invariably has its restricted scope. Another limitation is the attrition of respondents over time. Sample attrition is greatest amongst individuals in more deprived circumstances and our results may thus be a conservative estimate of the long term effects of early experience. Also the locus of control measure is a less well-used scale which makes it less easy to compare with other studies, though the psychometric qualities of the measure appear to be reasonably sound.

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**Table 1.** Social and demographic characteristics of the study participants and prevalence of binge drinking at 42 years.

	n	%	Prevalence of binge drinking %
<b>Sex</b>			
Male	2576	50	23.7
Female	2614	50	13.0
<i>Parental social class at birth</i>			
Unskilled (V)	231	4.5	27.3
Partly skilled (IV)	716	13.8	23.3
Skilled manual (III)	2321	44.7	19.0
Skilled non-manual (III)	830	16.0	17.6
Managerial/technician (II)	759	14.6	14.1
Professional (I)	333	6.4	8.7
<i>Educational qualifications</i>			
No qualifications	292	5.6	33.2
CSE 2-5/equivalent NVQ1	723	13.9	21.9
O Level/equivalent NVQ2	1732	33.3	29.1
A level/equivalent NVQ 3	503	9.7	22.2
Higher qualification/equivalent NVQ4	1558	30.0	13.2
University Degree/equivalent NVQ 5, 6	382	7.4	8.9
<i>Own current social class</i>			
Unskilled (V)	94	1.8	33.0
Partly skilled (IV)	574	11.1	22.0
Skilled manual (III)	835	16.1	29.0
Skilled non-manual (III)	948	18.3	16.2
Managerial/technician (II)	2382	45.9	15.4
Professional (I)	357	6.9	9.0

**Table 2.** Correlations of alcohol use, sex, parental social class, childhood intelligence, locus of control at teen, psychological distress, education and occupation.

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Binge drinking	.18 (.39)	–								
2. Frequency of alcohol use	2.52 (1.02)	<b>.476***</b>	–							
3. Sex	.50 (.50)	<b>-.138***</b>	-.165***	–						
4. Parental social class	3.42 (1.21)	<b>-.100***</b>	.131***	-.006	–					
5. Childhood intelligence	103.5 (14.0)	<b>-.089***</b>	.158***	-.037*	.300***	–				
6. Locus of control	14.37 (3.14)	<b>-.115***</b>	.111***	-.034*	.172***	.340***	–			
7. Psychological distress	1.48 (1.73)	<b>.039*</b>	-.050***	.143***	-.029*	-.065***	-.189***	–		
8. Educational qualifications	2.66 (1.37)	<b>-.145***</b>	.127***	.054***	.308***	.453***	.337***	-.063***	–	
9. Own occupational levels	4.16 (1.21)	<b>-.126***</b>	.093***	.010	.220***	.305***	.214***	-.040**	.439***	–

\*\*\* $p < .001$  \*\* $p < .01$  \* $p < .05$

*Note.* Variables were scored such that a higher score indicated being female, a higher score on binge drinking, a higher frequency of alcohol use, a more professional occupation for parents and cohort members, higher scores on childhood intelligence, higher scores on locus of control at teen, higher scores on psychological distress, and a highest educational qualification. Correlations between the outcome variable and a set of other variables examined are in bold.

**Table 3.** Odds ratios (95% CI) for binge drinking at age 42 years, according to sex, parental social class, childhood intelligence, locus of control at teen, psychological distress, educational qualifications, and current occupational levels.

<i>Measures</i>	<b>Model 1</b>		<b>Model 2</b>		<b>Model 3</b>	
	Odds ratio (95% CI)	<i>p</i> -value	Odds ratio (95% CI)	<i>p</i> -value	Odds ratio (95% CI)	<i>p</i> -value
Sex	0.50 (0.43, 0.57)***	<0.000	0.49 (0.43, 0.56)***	<0.000	0.52 (0.44, 0.60)***	<0.000
Parental social class ( <i>unskilled as reference group</i> ) at birth						
Partly skilled	0.83 (0.59, 1.17)	0.288	0.83 (0.59, 1.16)	0.275	0.85 (0.61, 1.18)	0.329
Skilled manual	0.65 (0.47, 0.88)**	0.006	0.64 (0.47, 0.87)**	0.003	0.67 (0.50, 0.92)*	0.021
Skilled non-manual	0.62 (0.44, 0.86)**	0.005	0.61 (0.43, 0.85)**	0.004	0.68 (0.47, 0.96)*	0.028
Managerial/technician	0.50 (0.35, 0.71)***	<0.000	0.49 (0.35, 0.70)***	<0.000	0.57 (0.40, 0.82)**	0.002
Professional	0.38 (0.23, 0.57)***	<0.000	0.36 (0.23, 0.57)***	<0.000	0.49 (0.31, 0.57)**	0.003
Childhood intelligence at age 11	0.85 (0.79, 0.91)***	<0.000	0.85 (0.79, 0.91)***	<0.000	0.93 (0.86, 1.01)	0.081
Locus of control at age 16	0.86 (0.82, 0.93)***	<0.000	0.88 (0.82, 0.94)***	<0.000	0.90 (0.84, 0.96)**	0.004
Psychological distress at age 34			1.31 (1.06, 1.61)*	0.012	1.28 (1.04, 1.58)*	0.020
Educational qualifications ( <i>no qualification as reference group</i> )						
CSE 2-5/equivalent NVQ1					0.63 (0.47, 0.85)	0.003
O Level/equivalent NVQ2					0.70 (0.53, 0.92)*	0.011
A level/equivalent NVQ 3					0.51 (0.36, 0.73)***	<0.000
Higher qualification/equivalent NVQ4 at age 34					0.52 (0.39, 0.72)***	<0.000
University Degree/equivalent NVQ 5, 6					0.39 (0.25, 0.61)***	<0.000
Own social class ( <i>unskilled as reference group</i> ) at age 42						
Partly skilled					0.77 (0.49, 1.25)	0.297
Skilled manual					0.85 (0.61, 2.06)	0.482
Skilled non-manual					0.67 (0.42, 1.08)	0.099
Managerial/technician					0.59 (0.38, 0.95)*	0.030
Professional					0.36 (0.20, 0.65)**	0.001

Note. \**p*<.05; \*\**p*<.01; \*\*\**p*<.001. Adjusted for gestational age and birth weight in all three models.